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1887.

AUTHOR'S EDITION.

FROM THE ANNUAL REPORT OF THE DEPARTMENT OF AGRICULTURE FOR THE YEAR 1887.

REPORT

OF

THE ORNITHOLOGIST,

C. HART MERRIAM, M. D.,

FOR

THE YEAR 1887.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1888.

POCKET GOPHER (GEOMYS BURSARIUS).

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REPORT OF THE ORNITHOLOGIST AND MAMMALOGIST.

SIR: I have the honor to submit herewith my second annual report upon the operations of the Division of Economic Ornithology and Mammalogy. It consists of two parts: (1) A statement of the work done during the year 1887; and (2) special reports embodying results of investigations.

STATEMENT OF WORK DONE.

The work of the division during the past year, as heretofore, has consisted chiefly in the collection of facts showing the relation of certain birds and mammals to agriculture, horticulture, and forestry; and in the preparation for publication of two important bulletins, namely, (1) on the English Sparrow, (2) on Bird Migration in the Mississippi Valley. In bringing together the necessary information two methods are employed, (*a*) the distribution of circulars of inquiry, and (*b*) work in the field and laboratory. The circulars of inquiry are distributed to a large number of farmers and persons known to be interested in birds throughout the country. The field work is carried on by members of the division staff and by special field agents employed for the purpose. These persons study the distribution and habits of the numerous species of known or supposed economic consequence, learning as much as possible about the food and breeding habits of each. Collections of stomachs are made for subsequent analysis, and much information is secured from farmers living in the neighborhood of the places visited. The results attained in this way are of the greatest value, because none but trained observers are employed. The field work is supplemented by laboratory work, which consists in the critical examination of the contents of stomachs, gizzards, and crops collected in the field. The elaboration of this material is a slow process, requiring much technical knowledge, as well as patience, on the part of the investigator. A single stomach sometimes contains representatives of several of the primary divisions of the animal kingdom. For instance, a Hawk's craw may hold at one time the remains of a meadow-mouse, a sparrow, a snake, a frog, a grasshopper, an earthworm, and a snail—representatives of the seven primary groups, mammalia, aves, reptilia, batrachia, arthropoda, vermes, and mollusca.

During the past year an assistant ornithologist, Dr. A. K. Fisher, has devoted most of his time to the study of the food material found in the stomachs of hawks and owls, of which the division has now upwards of six hundred. A brief statement of the contents of each stomach is made on a card prepared for the purpose, and these cards are arranged under species. A brief summary of the results of this investigation will be found in the present report.

The insect remains found in the various stomachs are submitted to Prof. C. V. Riley, Entomologist of the Department, for determination and report. A valuable report upon the insect food of the English Sparrow has been already received, and has been incorporated in the special bulletin on the English Sparrow (Bulletin No. 1 of the division).

The inquiry concerning the food habits of the Crow, the various Blackbirds or Grackles, and several other species of special economic importance, has resulted in the accumulation of so much information that special bulletins on these subjects will be published as soon as the material in hand can be properly arranged. The same is true of a number of species of Gophers and Mice, which have been found to exert marked effects upon agriculture or forestry.

A not unimportant incidental feature of the routine work of the division consists in the identification of specimens of birds and mammals sent to the Department for this purpose. The number of specimens thus sent reached several hundred during the past year and is constantly increasing. It is hardly necessary to add that great good is done by thus diffusing among the people an accurate knowledge of the birds and mammals with which they are surrounded.

Prof. Walter B. Barrows, assistant ornithologist, has been engaged in office work throughout nearly the entire year. He has been charged with the preparation for publication of the enormous mass of material in hand relating to the English Sparrow question. As stated in my annual report for 1886, circulars and schedules asking for information in regard to the English Sparrow were distributed by the division in 1885 and 1886. Replies were received from more than 3,000 persons. The information contained in these replies has been arranged for publication under seven different heads, as follows:

(1) Time and manner of first appearance of the English Sparrow; present abundance, and apparent rate of increase; kind and degree of assistance and protection afforded or withheld by man.

(2) Relation of the Sparrow to other birds.

(3) Injury to trees or vines.

(4) Injury to fruits and garden vegetables.

(5) Injury to grain.

(6) Relation of the Sparrow to injurious or other insects.

(7) Methods of restriction; suggestions for extermination; miscellaneous information.

The introductory portion of the Sparrow bulletin contains a synopsis of the principal facts brought to light by the investigation, together with deductions from the same, and suggestions to legislative bodies and to the people in regard to the best methods of abating the Sparrow scourge.

That the special bulletin on the English Sparrow question is one of general public interest, as well as importance, is shown by hundreds of applications for it that have been received at the Department in advance of its publication.

The bulletin on Bird Migration in the Mississippi Valley, by W. W. Cooke, was ordered to be printed in July, 1887, but has not yet been received from the Government Printer.

In addition to the office corps of the division, two persons have been employed as special field agents. Col. Alexander Macbeth, of Georgetown, S. C., has continued to serve the Department in collecting information relating to the Rice-bird problem, and Mr. Vernon

Bailey, of Elk River, Minn., has visited many parts of Minnesota, Dakota, and eastern Montana, for the purpose of studying the distribution and food habits of the various birds and mammals met with. This trip was particularly successful, and some of the results will be found in a special paper, forming a part of the present report. His report on birds treats of a very large number of species and is too bulky for publication in the Annual Report. His notes on the food of mammals and birds is an important contribution to economic zoology, and will be published as soon as supplemented by the results of the determination of the stomach contents collected by him. Much of Mr. Bailey's field work was done in the region where the eastern and western faunas meet or overlap, and the ranges of several species were determined with more precision than heretofore.

In connection with Colonel Macbeth's work in the rice-fields, a few experiments have been made with live Hawks for the purpose of frightening the birds from the fields. These experiments have been only partially successful, owing chiefly to the fact that the Department was unable to secure the services of an experienced falconer to train the Hawks and take charge of the experiments. One fact, however, was demonstrated, namely, that Rice-birds will not come near a live Hawk, even when resting on a stake; and when in motion, the Hawk is effective at much greater distances than when at rest. There can be no question that Hawks trained to fly about the fields would keep the Rice-birds off, and the expense would be less than that of the present system of "bird minding."

In addition to the investigations carried on by these special field agents, the assistant ornithologists, Prof. Walter B. Barrows and Dr. A. K. Fisher, made brief trips in order to obtain special information relating to subjects then under investigation. Professor Barrows visited the grape-growing district in central and western New York, and the results of his field work will be found in the special bulletin on the English Sparrow. Dr. Fisher visited northern Iowa, southern Minnesota, and southern Michigan, for the purpose of procuring information in regard to the depredations of Blackbirds and Gophers in the grain-fields of that area. Some of the results of his inquiry will be found in the present report.

A number of experiments in poisoning have been made by Dr. Fisher, for the purpose of ascertaining what poison or poisons may be used to best advantage in the destruction of certain pests.

The correspondence of the division continues to consume so large a portion of the time of the office force that it seriously interferes with the elaboration of material and the preparation of reports.

SPECIAL REPORTS.

The following special reports will be found herein:

(1) Food of Hawks and Owls. By Dr. A. K. Fisher, assistant ornithologist.

(2) Experiments in poisoning. By Dr. A. K. Fisher, assistant ornithologist.

(3) Some of the results of a trip through Minnesota and Dakota. By Vernon Bailey, special field agent.

(4) Notes on the depredations of Blackbirds and Gophers in Iowa and southern Minnesota. By Dr. A. K. Fisher, assistant ornithologist.

FOOD OF HAWKS AND OWLS.

By Dr. A. K. Fisher, *Assistant Ornithologist.*

The present brief synopsis of results, which is preliminary to a special report now in preparation on the food habits of the Hawks and Owls of the United States, is based on the examination of 1,072 stomachs, 651 of which are in the possession of the Department. Of the 421 stomachs not in the Department collection, the greater number were examined by Dr. B. H. Warren, State Ornithologist of Pennsylvania, and other members of the American Ornithologists' Union. The remainder were compiled from Prof. Samuel Aughey's "Notes on the Nature of the Food of the Birds of Nebraska"* and Mr. Edward Swift's recent article on "The Food of Rapacious Birds."†

Of the 1,072 stomachs examined, 89 were empty. Of the 983 containing food, 57 contained poultry; 20, game birds; 177, other birds; 528, mice; 137, other mammals; 51, reptiles and batrachians, and 255, insects. On looking at the following tables it will be seen that certain species feed principally on mice and insects, while others feed chiefly on poultry and small birds. In the latter category, fortunately, there are but 5 species in the Eastern States, namely, the Sharp-Shinned, Cooper's, Duck, and Pigeon Hawks, and the Great Horned Owl. Taking out the 126 stomachs of these five species, there remain 857 stomachs of 23 species, of which 31 contained poultry; 11, game birds; 109, other birds; 518, mice; 125, other mammals; 49, reptiles and batrachians, and 241, insects. In other words, poultry was found in but 3.6 per cent. of the 857 stomachs, while mice were found in 64.4 per cent.

In the accompanying tables the names of the animals found in the stomachs are given in general terms, such as *mouse, mole, shrew.* In nearly all cases (more than 99 per cent.) the exact species of each has been determined and recorded, and will be given in the final report. This is important, inasmuch as allied species often differ in economic consequence. Some small mammals are beneficial, and the injurious species are harmful in different degrees, according to their food habits and the character of the places which they inhabit.

The following persons have contributed stomachs of hawks and owls to the Department collection: Dr. W. C. Avery, Vernon Bailey, W. B. Barrows, F. M. Chapman, Hubert L. Clark, William Couper, F. T. Cuthbert, E. O. Damon, L. M. Davies, J. L. Davison, F. J. Dixon, William F. Doertenbach, William Dutcher, Jonathan Dwight, jr., Dr. A. K. Fisher, W. K. Fisher, M. M. Green, C. C. Hanmer, E. M. Hasbrouck, A. H. Hawley, J. H. Hendrickson, W. F. Hendrickson, H. W. Henshaw, H. K. James, C. A. Keeler, William G. W. Leizear, J. B. Lewis, William Lloyd, F. A. Lucus, Dr. C. Hart Merriam, G. S. Miller, jr., H. H. Miller, J. Percy Moore, F. S. Place, Charles W. Richmond, Robert Ridgway, C. B. Riker, John H. Sage, W. E. Saunders, J. M. Shaffer, Dr. Hugh M. Smith, R. W. Smith, F. Stephens, Willard E. Treat, Dr. B. H. Warren, F. S. Webster, H. G. White, Otto Widmann, A. H. Wood.

*First Annual Report of United States Entomological Commission, Appendix, pp. 42–46, 1878.

†Forest and Stream, Vol. XXX, No. 6, March 1, 1888, p. 104.

Statement of the stomach contents of more than 1,000 *Hawks and Owls.*

[In Dr. Warren's specimens, the cross (+) indicates that the stomach contained food of the character specified in the column-heading under which it occurs, but that its specific identity was not determined.]

SWALLOW-TAILED KITE (*Elanoides forficatus*).

Locality.	Date.	Poultry or game birds.	Other birds.	Mammals.	Miscellaneous.
Hawkinsville, Fla	Mar. 31, 1885				Lizard; tree-toad; grasshoppers; beetles.
Do	...do				Lizard; grasshoppers; beetles.
Dixon County, Nebr	June, 1865				60 locusts, 5 other insect.
Do	....do				69 locusts, 3 other insect.
Sarpy County, Nebr	Sept., 1873				75 insects.

Summary.—Of 5 stomachs examined 5 contained insects; 2, lizards; 1, tree-toad.

MISSISSIPPI KITE (*Ictinea mississippiensis*).

Madisonville, La	May 29, 1886				Fragments.
Do	May 30, 1886				Beetles.

Summary.—Of the 2 stomachs examined, both contained insects.

MARSH HAWK (*Circus hudsonius*).

Amityville, L. I., N. Y	Oct. 17, 1885			Meadow mouse.	
Washington, D. C	Oct. 29, 1886			3 meadow mice.	
Bergen County, N. J	Nov. 26, 1885			Meadow mouse.	
Washington, D. C	Jan., 1887			....do	
Sandy Spring, Md	Feb. 11, 1887		Junco		
Do	Oct. 2, 1887			Meadow mouse.	
Do	Oct. 14, 1887			....do	
Do	Nov. 17, 1887			2 pine mice; 2 meadow mice.	
Do	Nov. 18, 1887		Tree sparrow	Pine mouse; 2 meadow mice.	
Do	Nov. 23, 1887			Meadow mouse.	
Travare, Dak	July 5, 1887			2 striped gophers.	
Pembina, Dak	July 30, 1887			Striped gopher	
Do	...do			Hair of striped gopher.	
Do	....do			Striped gopher	
Oakdale, N. Y	Oct. 4, 1887			Shrew	
Long Island City, N. Y	Oct. 18, 1887			2 meadow mice.	
East Hartford, Conn	Sept. 17, 1887	Duck			
Cromwell, Conn	Oct. 5, 1886			Meadow mouse.	
Devil's Lake, Dak	Aug. 11, 1887			Striped gopher	
Do	Aug. 17, 1887			Meadow mouse.	
Sandy Spring, Md	Oct. 17, 1887			....do	
Do	Feb. 13, 1887				Empty.
Sing Sing, N. Y	Oct. 1, 1881	Fowl			
Do	Sept. 17, 1882		Small bird		
Wethersfield, Conn	Sept. 17, 1887			Mice	
Do	Sept. 24, 1887		Small bird	....do	
East Hartford, Conn	Nov. 12, 1886			3 meadow mice.	
Do	Oct. 17, 1886			2 meadow mice.	
Paint Rock, Tex	Dec. 7, 1886			Skunk	
Washington, D. C	Sept. 11, 1886	Fowl			
East Bradford, Pa	Aug. 22, 1878			Mice	
Westtown, Pa	Aug. 30, 1878		2 warblers	....do	
Oxford, Pa	Nov. 5, 1879			....do	
Brazile Creek, Nebr	Oct., 1869				Reptiles; 69 insects.
Do	....do				15 locusts; 77 other insects.
Otoe County, Nebr	Sept., 1864				71 locusts, 10 other insects.
Sarpy County, Nebr	....do				Lizard; 69 locusts.
Do	....do			Gopher	51 locusts.
Douglas County, Nebr	Oct., 1864				Lizards; 43 locusts.

Statement of the stomach contents of more than 1,000 Hawks and Owls—Continued.

MARSH HAWK (*Circus hudsonius*)—Continued.

Locality.	Date.	Poultry or game birds.	Other birds.	Mammals.	Miscellaneous.
Elmira, N. Y	May 7, 1886			4 mice	
Do	July 11, 1886			Mouse	Beetles.
Tyrone, N. Y	Aug. 17, 1886			Red squirrel	
Do	do			Field mice	
Barton, N. Y	Aug. 1, 1886	Woodcock.			Beetles.
Hale County, Ala	Mar. 17, 1888	Quail			
Washington, D. C	Mar. 28, 1888			Meadow mouse.	

Summary.—Of 46 stomachs examined 5 contained poultry or game birds; 5, other birds; 24, mice; 9, other mammals; 3, reptiles; 8, insects; and 1 was empty. Twenty-two stomachs examined by the division contained 21 mice.

SHARP-SHINNED HAWK (*Accipiter velox*).

Sing Sing, N. Y	Sept. 10, 1885				Empty.
Do	Sept. 17, 1885		2 warblers		
Do	do		Warbler		
Do	Sept. 24, 1885		Field sparrow		
Southold, N. Y	Nov. 20, 1885		Chippie, purple grackle.		
Alfred Centre, N. Y	Sept. 17, 1885		Warbler		
Taunton, Mass	Oct. 6, 1885		Goldfinch		
Do	Nov. 21, 1885		2 small birds		
Sing Sing, N. Y	Sept. 25, 1886		Junco and kinglet.		
Peterborough, N. Y	July 22, 1886		Small bird		
Portland, Conn	Mar. 27, 1886		Robin		
Maplewood, N. J	May 25, 1886		Oriole; swift		
Montgomery Co., Pa	Sept. 18, 1886		Small bird		
Woodstock, Conn	May 2, 1887		do		
Long Island City, N. Y	Sept. 21, 1887		English sparrow; warbler.		
Greensborough, Ala	Nov. 11, 1887		White-throated sparrow.		
Middletown, Conn	Jan. 19, 1887		2 English sparrows.		
Portland, Conn	Apr. 2, 1887		Robin		
Do	Oct. 20, 1887		Field sparrow		
Fort Buford, Dak	Sept. 9, 1887		Thrush		
Washington, D. C	Dec. 31, 1887		White-throated sparrow.		
Sing Sing, N. Y	Apr. 7, 1880		Robin		
East Hartford, Conn	Oct. 17, 1886		Warbler		
Easthampton, Mass	May 9, 1874		Junco		
South Windsor, Conn	Nov. 4, 1 87				
Portland, Conn	Nov. 8, 1886				Do.
Do	Feb. 4, 1881		Goldfinch		Do.
Fort Buford, Dak	Sept., 1887		Dove		
Sandy Spring, Md	Apr. 23, 1887				
Do	do				Do.
Do	do		Bluebird		Do.
Do	Sept. 20, 1887				
Do	Sept. 26, 1887		Small bird		Do.
Do	Oct. 2, 1887				
Do	Nov. 5, 1887				Do.
Do	Nov. 22, 1887				Do.
Chester County, Pa	Nov. 26, 1886		Fox sparrow; song sparrow.		Do.
Do	Sept. 20, 1884		Field sparrow		Beetles.
Do	Sept. 28, 1880	Quail			
Do	Sept. 10, 1874		English sparrow	Mice	
Do	Oct., 1875		+	do	
Do	Feb. 16, 1880			do	
Do	May 19, 1881	Poultry			Insects.
Elmira, N. Y	Mar. 4, 1886		English sparrow	Mouse	
Do	Apr. 18, 1886		Small bird		
Big Flats, N. Y	Sept. 23, 1886		English sparrow		
Do	do				Indeterminate.
Gainesville, Fla	Dec. 22, 1887				Empty.

Summary.—Of 48 stomachs examined, 2 contained poultry and game bird; 35, other birds; 4, mice; 2, insects; and 10 were empty. Total number of small birds, 41.

Statement of the stomach contents of more than 1,000 *Hawks and Owls*—Continued.

COOPER'S HAWK (*Accipiter cooperi*).

Locality.	Date.	Poultry or game birds.	Other birds.	Mammals.	Miscellaneous.
Taunton, Mass	Sept. 21, 1885	.....	Chewink	.....	
Do	Oct. 6, 1885	.....	....do	.....	1 grasshopper.
River Vale, N. J	Sept. 18, 1 86	.....	.....	.....	
Washington, D. C	Nov. 28, 1886	.....	Tree sparrow	.....	
Sing Sing, N. Y	Sept. 7, 1880	Chicken	.....	.....	
Do	Nov. 18, 1884	....do	.....	.....	
Greensborough, Ala	Oct. 28, 1887	.....	.....	.....	Empty.
Do	Mar. 6, 1887	Pigeon	.....	.....	
Do	July, 1887	....do	.....	.....	
Do	Aug. 4, 1887	....do	.....	.....	Do.
Do	Aug. 30, 1887	.....	.....	.....	
Do	Sept. 13, 1887	Pigeon	.....	.....	Sand lizard.
Do	Sept. 27, 1887	.....	.....	.....	Empty.
Wethersfield, Conn	Sept. 9, 1887	.....	.....	.....	Do.
East Hartford, Conn	July 31, 1887	.....	.....	.....	Empty.
Sandy Spring, Md	Jan. 14, 1887	Quail	.....	.....	
Do	Mar. 1, 1887	.....	Song sparrow	.....	
Do	Apr. 22, 1887	Chicken	.....	.....	
Do	May 7, 1887	...do	.....	.....	Do.
Do	May 25, 1887	.....	.....	.....	Do.
Do	Sept. 14, 1887	.....	.....	.....	Do.
Do	Sept. 21, 1887	.....	.....	.....	
Do	Nov. 24, 1887	.....	Purple grackle	.....	
Do	Dec. 26, 1887	Quail	.....	.....	
Do	Jan. 30, 1888	...do	.....	.....	
Do	Feb. 11, 188	.....	Junco: savanna sparrow.	.....	
Chester County, Pa	Nov. 13, 1886	.....	Junco	.....	
Do	Nov. 27, 1886	.....	Small bird	.....	
Do	Dec. 17, 1886	Chicken	.....	.....	
Do	Jan. 10, 1887	.....	Small bird	.....	
Do	Jan. 17, 1887	.....	.....	.....	Do.
Do	Feb. 1, 1887	.....	Small bird	.....	
Do	Feb. 20, 1887	Chicken	.....	.....	
Do	Mar. 3, 1887	.....	Meadow lark	.....	
Do	Dec. 6, 1878	.....	+	.....	
New Castle Co., Del	Nov. 1, 1878	Poultry	.....	.....	
Williston, Pa	Dec. 6, 1878	.....	+	.....	
East Bradford, Pa	May 25, 1875	.....	.....	.....	Frog.
East Goshen, Pa	May 20, 1877	.....	.....	Mice	Coleoptera.
West Chester, Pa	Aug. 25, 1876	.....	English sparrow	.....	
Pocopson, Pa	Nov. 12, 1879	Poultry	.....	.....	
West Chester, Pa	Sept. 10, 1880	.....	English sparrow	.....	
Sandy Spring, Md	Mar. 17, 1888	.....	Sparrow	.....	
Gainesville, Fla	Dec. 22, 188	.....	.....	.....	Empty.
Sandy Spring, Md	Mar. 24, 1888	.....	Song sparrow	.....	
Do	Apr. 2, 1888	.....	.....	.....	Do.

Summary.—Of 46 stomachs examined, 15 contained poultry or game birds; 17, other birds; 1, mice; 1, frog; 1, lizard; 2, insects; and 11 were empty.

GOSHAWK (*Accipiter atricapillus*).

Sandy Spring, Md	Dec. 27, 1887	.....	.....	Rabbit	
Adirondack, N. Y	Oct. 31, 1882	.....	.....	2 red squirrels	
Philadelphia, Pa	Jan. 12, 1886	.....	.....	Rabbit	
Dixon and Cedar Counties, Nebr.	Aug., 1867	.....	.....	....do	Few locusts.
Tioga, Pa	Feb. 17, 1886	.....	.....	Mouse; weasel	
Elmira, N. Y	Apr. 12, 1886	.....	.....	Mice	Beetles.

Summary.—Of 6 stomachs examined, 2 contained mice; 5, other mammals; 2, insects.

RED-TAILED HAWK (*Buteo borealis*).

Taunton, Mass	Nov. 18, 1885	.....	Feathers	.....	
Portland, Conn	Sept. 4, 1885	.....	.....	.....	2 adders; ribbon snake; toad.
Do	Nov. 25, 1885	Fowl	.....	.....	
Alfred Centre, N. Y	Aug. 28, 1886	.....	.....	.....	Grasshoppers.
Do	Oct. 25, 1886	.....	.....	Shrew	

Statement of the stomach contents of more than 1,000 *Hawks and Owls*—Continued.

RED-TAILED HAWK (*Buteo borealis*)—Continued.

Locality.	Date.	Poultry or game birds.	Other birds.	Mammals.	Miscellaneous.
Peterborough, N. Y	July 5, 1886	Fowl			
Oneida Lake, N. Y	Aug. 30, 1886			Red squirrel	
Morrisville, N. Y	Sept. 27, 1886			Meadow mouse.	
Chester Count', Pa	May 15, 1886	Fowl	Oriole	Rabbit	Grubs.
Do	Mar. 10, 1886			Meadow mouse.	
Birmingham, Pa	Mar. 15, 1886	Fowl	Grackle		
Portland, Conn	July 25, 1886				Empty.
Chickamauga, Tenn	Feb. 13, 1886				Offal.
Lockport, N. Y	July 13, 1886			4 meadow mice.	Toad; 2 beetles.
Forge, Suffolk County, N. Y.	Feb. 16, 1887	Fowl			
Whitewater, Wis	Aug. 17, 1887			Meadow mouse.	13 grasshoppers; 5 crickets; 1 beetle; 1 Crawfish.
Washington, D. C	May 4, 1887			Pine mouse; meadow mouse.	Large adder
Middletown, Conn	Nov. 20, 1886			Mouse	5 grasshoppers.
Portland, Conn	Dec. 29, 1886			Gray squirrel	
Gainesville, Va	Jan. 2, 1888			2 house mice	
Howard County, Md	Nov. 3, 1887				Empty.
Washington, D. C	Dec. 29, 1887		Song sparrow	Meadow mouse.	
Do	Jan. 20, 1888			House mouse; 3 meadow mice.	
Sing Sing, N. Y	Feb. 18, 1885			4 meadow mice; 2 white-footed mice; shrew.	
Do	Apr. 13, 1885			2 shrews	
Lewis County, N. Y	Aug. 3, 1876				Garter snake.
Portland, Conn	Mar. 2, 1887				Empty.
Troy, Pa			Screech owl		
Devil's Lake, Dak	Aug. 11, 1887			Gray gopher; striped gopher.	Frogs; 10 large grass-hoppers.
East Hartford, Conn	Sept. 14, 1885				2 frogs; potato beetle.
Sandy Spring, Md	Jan. 8, 1887			Pine mouse; shrew.	
Do	do			2 meadow mice	
Do	do			Meadow mouse; white-footed mouse; shrew.	
Do	do			4 house mice; 1 meadow mouse.	
Do	do			3 house mice; 1 meadow mouse; shrew.	
Do	do			3 meadow mice.	
Do	do			3 meadow mice; 3 shrews.	
Do	do			1 house mouse; 2 pine mice; 2 meadow mice; 1 shrew.	
Do	Jan. 14, 1887				Empty.
Do	do			1 pine mouse; 2 meadow mice.	
Do	Jan. 22, 1887			Meadow mouse.	
Do	do			do	
Do	do			do	
Do	Jan. 28, 1887			do	
Do	do		Crow	do	
Do	do		do		
Do	Feb. 11, 1887				Do.
Do	do			Meadow mouse.	Larva.
Do	do			Pine mouse; meadow mouse.	
Do	Mar. 2, 1887			Shrew	
Do	do				Do.
Do	do			Meadow mouse; 2 house mice.	
Do	do			1 meadow mouse; 1 house mouse.	
Do	do			2 meadow mice; gray squirrel.	
Do	do			Meadow mouse.	
Do	do			Shrew	

Statement of the stomach contents of more than 1,000 Hawks and Owls—Continued.

RED-TAILED HAWK (*Buteo borealis*)—Continued.

Locality.	Date.	Poultry or game birds.	Other birds.	Mammals.	Miscellaneous.
Sandy Spring, Md.	Mar. 2, 1887				Empty.
Do.	do	Fowl			
Do.	do			5 meadow mice.	
Do.	do		Bluebird	Meadow mouse.	
Do.	do		Tree sparrow		Grasshopper.
Do.	do			Meadow mouse.	
Do.	do			do	
Do.	Mar. 5, 1887		2 song sparrows	do	
Do.	do			Meadow mouse; white-footed mouse; mole.	
Do.	do		Song sparrow	Rabbit.	
Do.	do		Feathers		
Do.	do				Empty.
Do.	do			2 meadow mice; rabbit.	
Do.	Mar. 8–10, '87			Meadow mouse.	2 wood frogs.
Do.	do			do	
Do.	do				Empty.
Do.	do			3 meadow mice.	
Do.	do			2 moles	
Do.	do			Shrew	
Do.	do			Rabbit	
Do.	do			do	
Do.	do			Gray squirrel	
Do.	do			Meadow mouse; chipmunk.	Crawfish.
Do.	Mar. 12, 1887		Feathers		
Do.	Mar. 18, 1887		Robin	Meadow mouse.	
Do.	Mar. 24, 1887			3 meadow mice.	
Do.	Apr. 1, 1887		2 sparrows	Meadow mice.	
Do.	do			Pine mouse	
Do.	Apr. 25, 1887			Mole	Insect remains.
Do.	Apr. 28, 1887			Meadow mouse; gray squirrel.	
Do.	Nov. 14, 1887				Empty.
Do.	do				Do.
Do.	do				Do.
Do.	Nov. 27, 1887			Gray squirrel	
Do.	Dec. 12, 1887				Do.
Do.	do			House mouse	
Do.	Dec. 24, 1887			2 meadow mice.	
Do.	Dec. 26, 1887				Do.
Do.	do			1 house mouse; 1 meadow mouse; 3 shrews.	
Do.	do			Meadow mouse.	
Do.	do				Do.
Do.	Jan. 3, 1888			2 meadow mice.	
Do.	Jan. 7, 1888			Meadow mouse.	
Do.	Jan. 14, 1888		Meadow lark	3 meadow mice.	
Do.	Jan. 11, 1888			2 house mice	
Do.	Jan. 14, 1888	Fowl			
Do.	Jan. 19, 1888			5 meadow mice.	
Do.	Jan. 30, 1888		Crow		
Do.	Jan. 28, 1888			Meadow mouse.	
Do.	Jan. 30, 1888		Crow	House mouse	
Do.	Feb. 13, 1888				Do.
Do.	Feb. 18, 1888				Do.
Do.	Feb. 22, 1888				Do.
Chester County, Pa.	May, 1886	Fowl	Oriole	Gray squirrel	
Do.	Oct. 15, 1886			House mouse	
Do.	Nov. 22, 1886			Meadow mouse.	
Do.	Nov. 16, 1886	Fowl		do	
Do.	Dec. 4, 1886				Do.
Do.	Dec. 8, 1886				Offal.
Do.	Dec. 29, 1886			4 meadow mice.	
Do.	Feb. 11, 1887				Empty.
Do.	Feb. 16, 1887				Do.
Do.	Dec. 11, 1886		Sparrow		
Do.	Jan., 1887	Fowl		Meadow mouse.	
Do.	Dec. 11, 1886				Do.
Do.	Dec., 1886			House mouse; meadow mouse.	
Do.	do		Song sparrow.	2 meadow mice.	
Do.	Nov., 1886		do	Pine mouse	
Do.	do			do	
Do.	Feb. 16, 1887	Fowl			
Do.	Dec., 1886	do.		Meadow mouse; 2 house mice.	

Statement of the stomach contents of more than 1,000 Hawks and Owls—Continued.

RED-TAILED HAWK (*Buteo borealis*)—Continued.

Locality.	Date.	Poultry or game birds.	Other birds.	Mammals.	Miscellaneous.
Chester County, Pa.	Dec. 11, 1886			7 house mice	
Do	Dec. 18, 1886				Empty.
Do	Apr. 20, 1886			Mouse	Beetles.
Do	Dec. 28, 1886			4 meadow mice	
Do	Nov., 1886				Empty.
Do	do			Meadow mouse	
Do	do			2 meadow mice	
Do	do			3 meadow mice	
Do	do			2 meadow mice	
Do	Dec. 28, 1886			1 meadow mouse	
Do	do			Meadow mice; rabbit.	
Do	do			5 meadow mice	
Do	Jan. 15, 1887	Fowl			
Do	Nov., 1886			2 house mice; 1 meadow mouse	
Do	do			3 meadow mice	
Do	Jan., 1887			2 meadow mice; mole.	
Do	do			Meadow mouse; rabbit; shrew.	
Do	do			Meadow mouse; red squirrel.	
Do	do			3 meadow mice	
Do	Oct., 1886			3 meadow mice; red squirrel.	
Do	Dec., 1886			4 meadow mice	
Do	do			1 meadow mouse	
Do	Jan., 1887		Feathers	do	
Do	do			Rabbit	
Do	do		Feathers		
Do	Dec., 1886			3 meadow mice	
Do	Oct., 1886			Red squirrel	
Do	Dec., 1886	Fowl		House mouse	Grasshopper.
Do	do	do			
Do	Jan. 25, 1887			House mouse	
Do	do			Meadow mouse; white-footed mouse.	
Do	Jan. 26, 1887			Meadow mouse	
Do	do			6 meadow mice	
Do	Dec. 31, 1886			Mouse	
Do	Jan. 1, 1887			White-footed mouse; shrew.	
Do	Jan. 3, 1887			Meadow mouse	
Do	Jan. 7, 1887			Mouse	
Do	Jan., 1887			Meadow mouse	
Do	do			2 meadow mice	Frog.
Do	do			2 meadow mice; shrew.	
Do	do			1 meadow mouse	
Do	do			Meadow mouse	
Do	do			do	
Do	do			do	
Do	Jan. 18, 1887		Meadow lark		
Do	Jan. 17, 1887			House mouse	
Do	Jan. 22, 1887			5 meadow mice	
Do	Nov., 1886			Mouse	
Do	Dec., 1886			Red squirrel	
Do	Nov., 1886			Meadow mouse; red squirrel.	
Do	do			Meadow mouse	
Do	Jan., 1887		Tree sparrow		
Do	do				Empty.
Do	do		Crow		
Do	do			Meadow mouse	
Do	do			2 meadow mice; white-footed mouse.	
Do	Feb., 1887			Meadow mouse	
Do	do			do	
Do	do			6 meadow mice	
Do	do			Meadow mouse; shrew.	
Do	do			3 meadow mice; 2 house mice.	
Do	do				Offal
Do	Mar. 10, 1887			Shrew	
Do	do			Meadow mouse	
Do	do			2 meadow mice	

Statement of the stomach contents of more than 1,000 *Hawks and Owls*—Continued.

RED-TAILED HAWK (*Buteo borealis*)—Continued.

Locality.	Date.	Poultry or game birds.	Other birds.	Mammals.	Miscellaneous.
Chester County, Pa	Feb., 1887			7 meadow mice.	
East Bradford, Pa	Feb. 4, 1879			Mice	
Westtown, Pa	Jan. 5, 1881				Grasshoppers.
East Bradford, Pa	Feb. 15, 1879			Mice	
Do	do			do	
Do	do			do	
Williamstown, Pa	Apr. 4, 1878			do	
Westtown, Pa	Mar. 11, 1879			do	
Pocopson, Pa	Nov. 25, 1878	Quail			
Willistown, Pa	Jan. 3, 1879			Mice	
West Bradford, Pa	Jan. 13, 1879	Poultry			
Kennert, Pa	Jan. 15, 1879	do			
Do	do			Mice	
Willistown, Pa	Jan. 21, 1879			do	
Do	do			do	Insects.
East Bradford, Pa	Mar. 24, 1879			do	Do.
Do	Dec. 25, 1884			do	
Chester County, Pa	Feb. 15, 1878			do	
Birmingham, Pa	Dec. 31, 1884	Poultry			
Willistown, Pa	Jan. 6, 1885			Mice	
Do	do			do	
East Bradford, Pa	do			do	
Chester County, Pa	Jan. 5, 1881				Grasshoppers.
Willistown, Pa	Feb. 15, 1878			Mice	
Do	Oct., 1876		+	Rabbit	
East Bradford, Pa	Aug. 15, 1876		+		
Willistown, Pa	Apr. 8, 1877	Poultry		Mice	
Do	do	do			
Lancaster County, Pa	Apr. 2, 1878			Mice	
West Bradford, Pa	Nov. 25, 1879	Quail			
East Bradford, Pa	Feb. 4, 1879			Mice	
Caln, Pa	Feb. 22, 1879			do	
Do	do			do	
Westtown, Pa	Jan. 23, 1879			do	
Do	do			do	
East Bradford, Pa	Jan. 20, 1879			do	
Westtown, Pa	Jan. 28, 1879			do	
Do	do			do	
Do	Jan. 20, 1879			do	
Do	do			do	
East Bradford, Pa	Feb., 1879			do	
Do	do			do	
Lancaster County, Pa	Apr. 2, 1878			do	
East Bradford, Pa	Feb., 1879			do	
Westtown, Pa	Jan. 28, 1879			do	
Chester County, Pa	do				Offal.
Pocopson, Pa	Feb. 8, 1879			Mice	
Caln, Pa	Feb. 9, 1879			do	
West Goshen, Pa	Feb. 7, 1879			do	
Westtown, Pa	Jan. 29, 1879			do	
Maryland	Feb., 1879			Red squirrel; mice.	
East Bradford, Pa	Feb. 8, 1879			Mice	
Willistown, Pa	Jan. 21, 1879			do	
West Whiteland, Pa	Mar., 1879			3 mice	
Willistown, Pa	Jan. 13, 1879			Mice	
Chester County, Pa	Jan. 3, 1879	Poultry			
West Bradford, Pa	Jan. 3, 1880	do			
Willistown, Pa	Nov. 27, 1874			Red squirrel	
East Bradford, Pa	Dec., 1882			Red squirrel; mice.	
Willistown, Pa	Jan., 1882			Rabbit	
Westtown, Pa	Jan. 5, 1881			Mice	Grasshoppers and crickets.
Willistown, Pa	Jan. 2, 1880			do	Insects.
West Bradford, Pa	Nov. 27, 1880			do	
Willistown, Pa	Mar. 27, 1880		+	do	
Do	Mar. 22, 1880	Quail			
East Goshen, Pa	Mar. 20, 1880			Red squirrel; mice.	
Willistown, Pa	do			Mice	
Birmingham, Pa	Feb. 26, 1880			do	
Delaware County, Pa	Feb. 22, 1880			do	
Do	do			do	
Do	Jan. 30, 1880			do	
Westtown, Pa	Dec. 5, 1879			do	
Chester County, Pa	Dec. 3, 1879	Poultry			
Do	do			Mice	
New Garden, Pa	Nov. 26, 1879			do	
East Goshen, Pa	Sept. 15,			do	

Statement of the stomach contents of more than 1,000 Hawks and Owls—Continued.

RED-TAILED HAWK (*Buteo borealis*)—Continued.

Locality.	Date.	Poultry or game birds.	Other birds.	Mammals.	Miscellaneous.
Chester County, Pa	Dec. 10, 1877	Poultry			
Do	Oct. 3, 1880			Mice	
Willistown, Pa	Feb., 1876		Feathers		
Do	Jan. 20, 1876			Mice	
Do	Jan., 1876			do	
Do	Dec. 19, 1878			do	
Do	Jan. 18, 1875			do	
Do	Nov. 20, 1876			do	
Do	Mar. 26, 1876			do	
Chester County, Pa	Sept., 1874			Gray squirrel	
West Goshen, Pa	Dec., 1875			Mice	
East Goshen, Pa	Feb. 19, 1875				Empty.
Dakota City, Nebr	July, 1870	Quail			37 insects
Elmira, N. Y	June 1, 1886			Rat; red squirrel	
Do	June 19, 1886	Chicken			
Do	July 21, 1886				Grasshopper; beetles.
Do	Oct. 2, 1886			3 mice	
Wellsburgh, N. Y	Apr. 7, 1887			Hair	Beetles
Halsey Valley, N. Y	Aug. 10, 1887			2 mice	Grasshoppers
Sandy Spring, Md	Mar. 6, 1888		Tree sparrow		
Do	do		2 tree sparrows; 1 song sparrow.	Meadow mouse.	
Do	Mar. 7, 1888				Empty.
Do	do				Do.
Do	do		Song sparrow; junco.	Meadow mouse; rabbit.	
Do	Mar. 9, 1888			Mole	
Do	Mar. 15, 1888				Do.
Do	do		Song sparrow	Meadow mouse.	
Do	do			2 house mice	
Do	Mar. 17, 1888			Shrew	
Do	do			Meadow mouse.	
Do	Mar. 19, 1888			do	
Gainesville, Fla	Jan. 4, 1888			2 cotton rats	
Sandy Spring, Md	Mar. 24, 1888			1 pine mouse; 1 meadow mouse	
Chester County, Pa	Feb., 1887			2 meadow mice	
Do	Jan., 1887			do	
Do	Apr., 1887			3 meadow mice	
Do	Feb., 1887			Meadow mice	
Do	do			do	
Do	do			do	
Do	do			do	
Sandy Spring, Md	Mar. 28, 1888				Toad; crawfish.
Do	Mar. 30, 1888			2 meadow mice.	May beetle; other insects.
Do	Apr. 18, 1888				Empty.

Summary.—Of 311 stomachs examined, 20 contained poultry or game birds; 35, other birds; 203, mice; 55, other mammals; 9, batrachians or reptiles; 24, insects; 3, crawfish; 4, offal; and 29 were empty. Two hundred and ten examined by the division contained 270 mice.

RED-SHOULDERED HAWK (*Buteo lineatus*).

Sing Sing, N. Y	Oct. 3, 1885		Flicker		Toad; snake; cricket; larva.
Alfred Centre, N. Y	Sept. 11, 1885			Mouse	Grasshopper; larva; spider.
Do	Sept. 13, 1886			4 shrews	Grasshoppers; spider.
Do	Sept. 12, 1886				Grasshoppers.
Peterborough, N. Y	June 25, 1886				Frogs; beetles.
Do	do			Red-backed mouse; 3 shrews.	
Do	June 28, 1886			Meadow mouse; 3 shrews.	Beetles; crawfish; spider.
Do	do			1 shrew	
Do	July 28, 1886				Insects
Oneida Lake, N. Y	Aug. 30, 1886				Squash bug
Morrisville, N. Y	Sept. 6, 1886			Meadow mouse; 1 shrew.	10 grasshoppers
Birmingham, Pa	Mar. 15, 1886		Feathers		

Statement of the stomach contents of more than 1,000 *Hawks and Owls*—Continued.

RED-SHOULDERED HAWK (*Buteo lineatus*)—Continued.

Locality.	Date.	Poultry or game birds.	Other birds.	Mammals.	Miscellaneous.
Chester County, Pa	Jan. 3, 1886				Cricket; larva; 2 spiders.
East Hartford, Conn.	Dec. 14, 1886			Meadow mouse.	Frog.
Gainesville, Fla	Feb. 28, 1887				Do.
Do	Mar. 17, 1887				Frog; dragon flies.
Do	Apr. 7, 1887				Lizard; 2 crickets; larva of beetles.
Do	Apr. 11, 1887				Snake; insects; earth worm.
Greensborough, Ala	Nov. 19, 1887				Grasshopper; crickets.
East Hartford, Conn	Apr. 5, 1887			Shrew	Garter snake; bull-frog.
Do	July 5, 1887			Meadow mouse.	Beetle; wasp; larva.
Portland, Conn	Oct. 29, 1887				Leopard frog.
Washington, D. C.	Dec. 24, 1887			House mouse; 2 meadow mice.	Crawfish.
Do	....do			Meadow mouse; shrew.	Frog; grasshoppers.
Do	Jan. 22, 1888				Empty.
Greensborough, Ala	Feb. 16, 1888				Grasshoppers; beetles.
Locust Grove, N. Y	Aug. 24, 1876				Grasshoppers.
Sing Sing, N. Y	Apr. 8, 1880			Mouse	
Do	May 6, 1880			Meadow mouse; shrew.	2 toads; grasshopper.
Do	Sept. 19, 1882				Toad; larvæ.
Do	Feb. 2, 1884			2 shrews	Frog; salamander.
Do	Feb. 14, 1885			Mole	
Do	Apr. 2, 1885			Meadow mouse; shrew.	
Portland, Conn	Oct. 18, 1886			Mice	
East Hartford, Conn	Oct. 29, 1886			Mole	
Sandy Spring, Md	Jan. 8, 1887			House mouse	
Do	....do			2 house mice; white-footed mouse; 1 meadow mouse.	
Do	Jan. 28, 1887			4 meadow mice.	
Do	Feb. 11, 1887			Pine mouse; meadow mouse; shrew.	Tree-frog; beetle; spider.
Do	Mar. 8, 1887			House mouse	
Do	....do			Mouse	
Do	....do			2 meadow mice.	
Do	Mar. 24, 1887		Screech-owl	Meadow mouse.	
Do	Nov. 26, 1887				Grasshoppers; beetles; spider.
Do	Dec. 3, 1887			Meadow mouse.	Grasshopper.
Do	....do			Pine mouse	
Do	Dec. 9, 1887			Meadow mouse.	
Do	Dec. 27, 1887			4 meadow mice.	
Do	Jan. 30, 1888			1 mole	
Do	....do		Field sparrow		
Do	....do		Carolina dove	Meadow mouse.	
Chester County Pa	Nov. 23, 1886			2 meadow mice.	Grasshopper.
Do	Jan. 20, 1886				Insects.
Do	Apr. 3, 1886			Opossum	Crickets; larvæ.
Do	Nov. 29, 1886			Mouse	
Do	Dec. 1, 1886			Meadow mouse.	
Do	Dec. 2, 1886			....do	
Do	Dec. 15, 1886			Shrew	
Do	Dec. 16, 1886			Meadow mouse.	
Do	Jan. 21, 1886			5 meadow mice.	
Do	Jan. 26, 1887			....do	
Do	Jan. 28, 1887			Mouse	
Do	Jan., 1887			....do	
Do	....do			....do	
Do	Dec. 18, 1886			Meadow mouse; rabbit.	
Do	Dec. 20, 1886			Meadow mouse.	Larva; offal.
Do	Jan. 18, 1887			....do	
Do	....do				Empty.
Do	Jan., 1887			Meadow mouse.	
Do	Feb., 1887			3 meadow mice.	

Statement of the stomach contents of more than 1,000 *Hawks and Owls*—Continued.

RED-SHOULDERED HAWK (*Buteo lineatus*)—Continued.

Locality.	Date.	Poultry or game birds.	Other birds.	Mammals.	Miscellaneous.
Willistown, Pa	Feb. 20, 1 81			Mice	
Do	Mar. 3, 1881			Rabbit	
Pennsylvania	Dec. 25, 1879			Mice	Grasshoppers.
West Chester, Pa	Dec. 9, 1879			do	Do.
West Pikeland, Pa	do				Do.
Westtown, Pa	Feb. 4, 1878			+	Do.
Do	Feb. 4, 1879			+	Do.
Willistown, Pa	Jan 21, 1879				Empty.
Volusia County, Fla	Mar. 18, 1886				Catfish.
Saint John's River, Fla	Mar. 14, 1886			+	Insects.
Milltown, Pa	Dec. 29, 1884			Mice	
Thornburgh, Pa	Jan. 8, 1885			do	Do.
Westtown, Pa	Jan. 10, 1879			do	
Do	Jan. 28, 1879			do	
Do	Feb. 20, 1879			do	
Do	Jan. 27, 1879			do	Do.
Do	Feb. 4, 1879			do	
Do	Feb., 1879			do	
Do	Feb., 1878			do	
Willistown, Pa	Apr. 3, 1877			do	
Chester County, Pa	Nov. 30, 1879				Do.
Pennsylvania	Jan. 5, 1881			Mice	
Barton, N. Y	Jan. 1, 1886			3 mice	
Elmira, N. Y	Jan. 21, 1886	Chicken			
Do	Apr. 5, 1886			Field mice	
Do	Aug. 13, 1887			Skunk	
Big Flats, N. Y	Sept. 5, 1887				Grasshoppers; beetles.
Corning, N. Y	Sept. 23, 1887			Field mice	Insects.
Greensborough, Ala	Feb. 25, 1888			Mouse	Lizard; grasshopper; cockroach; 3 crawfish.
Sandy Spring, Md	Mar. 17, 1888			Meadow mouse	
Gainsville, Fla	Jan. 4, 1888				Spider.
Do	Jan. 18, 1888				4 mole crickets; 20 larvæ.

Summary.—Of 102 stomachs examined, 1 contained poultry; 5, other birds; 61, mice; 20, other mammals; 15, reptiles or batrachians; 40, insects; 7, spiders; 3, crawfish; 1, earthworm; 1 offal; 1 catfish; and 3 were empty.

SWAINSON'S HAWK (*Buteo Swainsoni*).

Cedar County, Nebr	Aug., 1867.			Gopher	68 locusts.
Do	do			do	61 locusts.
Dakota County, Nebr	July, 1868			Rabbit	58 insects.
Sarpy County, Nebr	Sept., 1872			Gopher; mouse	65 insects.

Summary.—Of 4 stomachs examined each one contained small mammals and insects.

BROAD-WINGED HAWK (*Buteo latissimus*).

Sing Sing, N. Y	Sept. 19, 1885			Chipmunk	Crickets; grasshoppers.
Middle Haddam, Conn	Sept. 4, 1885				Toad.
London, Canada	Sept. 22, 1883				Toad: large number larvæ.
Lockport, N. Y	Apr. 27, 1886			Meadow mouse	Snake; 2 beetles.
Brooklyn, Ohio	May 10, 1886			Chipmunk; shrew.	
Washington, D. C	June 5, 1887		3 oven birds	2 shrews	
Syracuse, N. Y	Apr. 30, 1887				Toad.
Roane Mountain, N. C	Aug. 10, 1887			Mouse	
Long Island City, N. Y	Sept. 23, 1887				Garter snake; toad; larvæ; beetles.
Do	Sept. 24, 1887				Larva.
Do	do				Quantity of crickets.
Sing Sing, N. Y	Sept. 21, 1881				8 elm sphinx larvæ.

Statement of the stomach contents of more than 1,000 *Hawks and Owls*—Continued.

BROAD-WINGED HAWK (*Buteo latissimus*)—Continued.

Locality.	Date.	Poultry or game birds.	Other birds.	Mammals.	Miscellaneous.
Sing Sing, N. Y.	Sept. 23, 1881				Elm sphinx larvæ.
Lake George, N. Y.	Aug. 2, 1882				Garter snake.
Sing Sing, N. Y.	May 8, 1885				Quantity of earth worms.
Troy, N. Y.	Sept. 19, 1885				Tree-frog; grasshoppers.
Sandy Spring, Md	May 10, 1887			Chipmunk; shrew.	
Do	Sept. 1, 1887				Grasshopper.
Chester County, Pa.	May 28, 1878				Frog.
Elmira, N. Y.	June 27, 1885			Large rat; field mouse.	
Do	Apr. 9, 1886			Weasel	
Do	July 3, 1887		Small bird		

Summary.—Of 22 stomachs examined, 2 contained small birds; 3, mice; 5, other mammals; 8, reptiles or batrachians; 10, insects; and 1, earth worms.

ROUGH-LEGGED HAWK (*Archibuteo lagopus-sancti johannis*).

Chester County, Pa.	Dec. 9, 1886			Shrew	
Northampton, Mass.	Feb. 23, 1887			2 meadow mice.	
Do	Feb. 16, 1887			7 meadow mice.	
South Windsor, Conn.	Mar. 29, 1887			Meadow mouse.	
Portland, Conn	Mar. 30, 1887			6 meadow mice.	
Northampton, Mass.	Nov. 30, 1887			5 meadow mice.	
Do	Dec. 2, 1887			Meadow mouse; house mouse.	
Do	Dec. 14, 1887			6 meadow mice.	
Do	Dec. 20, 1887			3 house mice	
Do	Nov. 26, 1886			Meadow mice	
Do	Nov. 27, 1886			do	
Do	Dec., 1886			do	
Chester County, Pa.	Feb., 1887			Meadow mouse.	
Do	Jan. 28, 1879			Mice	
Do	do			do	
Do	Dec. 27, 1878			do	
Do	Apr., 1876			do	
Do	Mar. 20, 1880			do	
Beatrice, Nebr.	Sept., 1879			Gopher	Lizard; 70 insects.
Elmira, N. Y.	Nov. 5, 1887			Rabbit	
Do	Jan. 3, 1888			Weasel	
Sandy Spring, Md	Mar. 17, 1888			2 meadow mice.	
Northampton, Mass.	Apr. 9, 1888			do	
Do	Apr. 14, 1888			8 meadow mice.	
Do	do			2 meadow mice.	
Do	Apr. 15, 1888				Empty.
Do	do			2 meadow mice.	
Do	do			3 meadow mice.	

Summary.—Of 28 stomachs examined, 23 contained mice; 4, other mammals; 1, lizard; 1, insects; 1 was empty. Seventeen stomachs examined by the division contained 52 mice.

GOLDEN EAGLE (*Aquila chrysaëtos*).

Gaithersburgh, Md	Dec. 8, 1887				Carrion.

Summary.—The stomach examined contained carrion.

BALD EAGLE (*Haliœetus leucocephalus*).

Sandy Spring, Md	Jan. 28, 1887				Carrion.
Oneida Lake, N. Y.	Aug. 30, 1886				Sunfish.
Do	do				Fish.
Sing Sing, N. Y.	Feb. 27, 1881				Goldfish.
Paint Rock, Tex.	Jan. 28, 1887			2 prairie dogs	
Gainesville, Fla.	Jan. 13, 1888				Fish and offal.

Summary.—Of 6 stomachs examined, 1 contained mammals; 2, carrion; 4, fish.

Statement of the stomach contents of more than 1,000 *Hawks and Owls*—Continued.

PRAIRIE FALCON (*Falco mexicanus*).

Locality.	Date.	Poultry or game birds.	Other birds.	Mammals.	Miscellaneous.
Sarpy County, Nebr....	Sept., 1874	.....	Prairie hen	.....	16 locusts.

Summary.—The 1 stomach examined contained a game bird and insects.

DUCK HAWK (*Falco peregrinus anatum*).

Portland, Conn	Apr. 29, 1886	Duck ...	.....	....	Beetles.
East Bradford, Pa.....	Feb. 14, 1886	.....	Feathers	....	
Do.....	Mar. 27, 1880	Fowl ...	.....	.....	
Watkins, N. Y.....	Oct. 28, 1887	.....	Meadow lark ...	.....	
Elmira, N. Y	Dec. 3, 1887	.....	.....	2 mice	

Summary.—Of 5 stomachs examined, 2 contained poultry and remains of game bird; 2, remains of other birds; 1, mice; 1, insects.

PIGEON HAWK (*Falco columbarius*).

Shelter Island, N. Y	Sept. 11, 1886	.....	Small bird	.....	
Portland, Conn.....	May 6, 1886	....	Swift	.....	
Lockport, N. Y	May 14, 1886	.....	Song sparrow ..	.....	
Rockville, Conn	Sept. 20, 1886	....	.....	.....	25 crickets; 6 grasshoppers.
Long Island City, N.Y..	May 3, 1886	.....	English sparrow	.....	
Sayville, N. Y.....	Sept. 14, 1887	.....	.....	.....	Dragon flies; other insects.
East Hartford, Conn...	Sept. 10, 1887	.....	Small bird.....	.....	
Sing Sing, N. Y.....	May 3, 1880	.....	Feathers	.....	
East Hartford, Conn...	Sept. 24, 1886	.....	Indigo bird	.....	
West Chester, Pa	Feb. 20, 1878	.....	Feathers	.....	
Barton, N. Y.....	Aug. 2, 1886	.....	Flicker	.....	
Do.....	....do	.....	.....	Field mice.....	Insects.
Do.....	Aug. 3, 1886	.....	.....	....do	Do.
Elmira, N. Y	June 4, 1886	.....	English sparrow	.....	
Do.....	....do	.....	....do	.....	
Do.....	July 3, 1885	.....	.....	.....	Grasshoppers; small beetles.
Horseheads, N. Y.....	Aug. 14, 1885	.....	.....	.....	Small insects.
Elmira, N. Y.....	Aug. 29, 1885	.....	.....	.....	Grasshoppers; beetles.
Gainesville, Fla.....	Jan. 4, 1888	.....	Field sparrow; warbler.	.....	

Summary.—Of 19 stomachs examined, 12 contained small birds; 2, mice; 7, insects.

SPARROW HAWK (*Falco sparverius*).

Locust Grove, N. Y.....	Aug. 18, 1885	.....	.....	.....	Spider; grasshoppers.
Sing Sing, N. Y..... ..	Sept. 22, 1885	.....	.....	.....	Insect remains.
Washington, D. C.....	Nov. 3, 1885	.....	.....	.....	Grasshoppers; crickets.
Alfred Centre, N. Y.....	Sept. 4, 1885	.....	.....	.....	Larvæ.
Volusia County, Fla....	Mar. 1, 1885	.....	.....	.....	Lizard.
Do.....	Apr. 4, 1885	.....	.....	.....	2 lizards; insect remains.
Peterborough, N. Y.....	July 13, 1886	.....	.....	Hair of mice ...	
Do.....	July 24, 1886	.....	.....	.....	Grasshoppers; crickets.

Statement of the stomach contents of more than 1,000 *Hawks and Owls*—Continued.

SPARROW HAWK (*Falco sparverius*)—Continued.[1]

Locality.	Date.	Poultry or game birds.	Other birds.	Mammals.	Miscellaneous.
Peterborough, N. Y	July 24, 1886		Sparrow		Crickets.
Chester County, Pa	July 28, 1886				Grasshopper and crickets.
Do	....do				Grasshoppers and crickets.
Do	Feb. 24, 1886				Larvæ.
East Windsor Hill, Conn.	Feb. 4, 1886				Empty.
Maplewood, N. J	Jan. 16, 1886		Song sparrow		
Do	May 25, 1886		Vireo		
Lockport, N. Y	Aug. 31, 1886				30 crickets.
Avon, Ohio	July 5, 1886				Remains of insects.
Baddeck, Nova Scotia	Aug. 13, 1886				Grasshoppers.
Gainesville, Fla	Apr. 20, 1887				Lizard; beetle; larvæ.
Harwood, Dak	July 13, 1887			Mouse	
Long Island City, N. Y	Sept. 16, 1887				Grasshoppers and crickets.
East Hartford, Conn	Sept. 9, 1887				Do.
Portland, Conn.	Apr. 12, 1887			Meadow mouse	Remains of insects.
Devil's Lake, Dak	Aug. 13, 1887				Snake; grasshoppers; crickets; larvæ.
Bottineau, Dak	Aug. 27, 1887				Cricket.
Washington, D. C	Dec. 24, 1887			House mouse	Grasshoppers; beetles.
Do	....do				Grasshoppers.
Do	Dec. 25, 1887			House mouse	6 grasshoppers.
Do	Dec. 27, 1887		English sparrow		Grasshoppers.
Sing Sing, N. Y	Apr. 10, 1880				Do.
Do	Jan. 29, 1883			Meadow mouse	
Do	Jan. 14, 1885			....do	
East Hartford, Conn	Sept. 18, 1886		Song sparrow		
Do	July 16, 1886		Sparrow		Grasshoppers.
Do	Oct. 13, 1886			Meadow mouse	Do.
Sandy Spring, Md	Jan. 28, 1887			....do	
Do	Mar. 2, 1887			House mouse	Grasshopper.
Do	....do			Mouse hair	
Do	....do			House mouse	Remains of insects.
Do	....do			Meadow mouse	Do.
Do	....do			White-footed mouse; house mouse.	
Do	....do		Song sparrow		
Do	....do				Do.
Do	Mar. 8, 1887		Song sparrow		15 crickets.
Do	Mar. 12, 1887				Grasshoppers; crickets; caterpillars; beetles.
Do	Mar. 18, 1887		Vesper sparrow		Larva.
Do	....do			Meadow mouse	Cricket; beetles.
Do	Mar. 24, 1887			House mouse	Cricket; larvæ.
Do	....do				Empty.
Do	Apr. 1, 1887			Meadow mouse	
Do	Apr. 8, 1887				Do.
Do	....do			Meadow mouse	Crickets; beetles; spider.
Do	Apr. 28, 1887			Mouse	Spider.
				Meadow mouse	Grasshoppers; white grubs.
Do	May 13, 1887				
Do	June 23, 1887				Grasshoppers and crickets.
Do	Sept. 26, 1887				Grasshoppers; spider;
Do	Oct. 28, 1887				Grasshoppers; crickets; spider.
Do	Jan. 2, 1888			Shrew	Grasshopper.
Do	Feb 22, 1888			Meadow mouse	
Do	Nov. 26, 1887				Grasshoppers, etc.
Chester County, Pa	Apr. 3, 1886			Meadow mouse	Caterpillars.
Do	Dec. 29, 1886			Mouse	
Do	Dec. 28, 1886			Meadow mouse	Crickets; grasshoppers.
Do	Dec. 29, 1886		Sparrow		
Do	Jan. 17, 1886		Song sparrow	White-footed mouse.	
Do	Feb. 8, 1886		Tree sparrow	....do	

Statement of the stomach contents of more than 1,000 Hawks and Owls—Continued.

SPARROW HAWK (*Falco sparverius*)—Continued.

Locality.	Date.	Poultry or game birds.	Other birds.	Mammals.	Miscellaneous.
Chester County, Pa	Dec. 1, 18 6			Meadow mouse	Grasshoppers; cricket; larvæ.
Do	Dec. 3, 18 6				Beetle.
Do	Dec. 9, 1886		Junco		
Do	do		Feathers	Meadow mouse; 2 shrews.	
Do	Dec. 16, 1886		do		
Do	Nov. 26, 1886			Meadow mouse	Crickets.
Do	Feb. 7, 1887			do	Crickets; caterpillars; spider.
Do	Jan. 12, 1887		Tree sparrow		
Do	Mar. 10, 1886				Empty.
Do	Jan. 6, 1885				Caterpillars; spider.
Do	Mar. 15, 1886				Empty.
Do				Meadow mouse	Grasshoppers; larvæ.
Do	Jan., 1887			do	
Do	do				8 Larvæ; spider.
Do	Dec. 30, 1886			Meadow mouse	Larva.
Do	Jan. 10, 1887		Song sparrow		
Do	Feb. 9, 1886				Grasshoppers; beetles; larvæ.
Do					Remains of insects.
Do				Meadow mouse	
Do	Jan., 1887			House mouse	Grasshoppers; 10 larvæ.
Do				Meadow mouse	Grasshopper larvæ; beetle.
Do	Jan. 25, 1887			House mouse	Crickets; larvæ.
Do	do			Meadow mouse	5 grasshoppers; 5 larvæ; spider.
Do	do			do	
Do	Jan. 27, 1887			do	
Do	Jan., 1 87		Tree sparrow	do	Caterpillar; crickets; spider.
Do	Feb. 1, 1887			White-footed mouse.	
Do	do			2 meadow mice	
Do	do				6 caterpillars; 6 grasshoppers; spider.
Do	Nov. 29, 1886				Insects.
Do	July 3, 1886				Do.
Do	Dec. 30, 1879		Meadow lark		
Do	Dec. 16, 1879		Junco	Mice	
Drayton Island, Fla	Feb. 30, 1885		Feather		Do.
Goshen, Pa	Jan. 12, 1881			Mice	
West Chester, Pa	Oct. 27, 1880				Do.
Chester County, Pa	Dec. 23, 1880		Meadow lark		Do.
Do	Jan. 12, 1881			Mice	
Do	Jan. 17, 1881			do	
Do	Sept. 24, 1880				Grasshopper.
Do	Feb. 16, 1880			Mice	
Delaware County, Pa	Jan. 30, 1880			do	
Chester County, Pa	Jan. 4, 1881			do	
East Bradford, Pa	Jan. 1, 1880				Insects.
Chester County, Pa	Nov. 20, 1879				Do.
Do	Aug. 25, 1876			Mice	
Do	July, 1870			Bat	
Do	Jan. 16, 1879		Junco	Mice	
Dixon County, Nebr	July, 1865			Mouse	8 locusts; 27 other insects.
Dakota County, Nebr	do			Gopher	38 insects.
Do	June., 1866	Quail			29 insects.
Do	July, 1866				34 insects.
Do	Aug., 1867			Rabbit	22 insects.
Cedar County, Nebr	do			Mice	47 locusts.
Pierce County, Nebr	July, 1869			Gopher	40 insects.
Sarpy County, Nebr	Sept., 1871			Mice	37 insects.
Do	June, 1872		Birds		43 insects.
Lancaster Co., Nebr	Sept., 1873				40 insects; frogs.
Hale County, Ala	Mar. 17, 1888				Grasshoppers; crickets.
Gainesville, Fla	Jan. 4, 1888				Remains of insects.
Do	Jan. 9, 1888				Larvæ and other insects.

Statement of the stomach contents of more than 1,000 *Hawks and Owls*—Continued.

SPARROW HAWK (*Falco sparverius*)—Continued.

Locality.	Date.	Poultry or game birds.	Other birds.	Mammals.	Miscellaneous.
Los Gatos, Cal	Dec. 7, 1887		Sparrow		
Do	Dec., 1887				Crickets.
Do	Jan. 19, 1885		Warbler		
Do	Dec. 31, 1887		Meadow lark; sparrow.		
Sandy Spring, Md	Apr. 2, 1888		Field sparrow		White grub; beetles; spider.
Chester County, Pa	Feb. 7, 1887				Caterpillar.

Summary.—Of the 133 stomachs examined, 1 contained game bird; 28, other birds; 55, mice; 6, other mammals; 5, reptiles or batrachians; 83, insects; 12, spiders; and 5 were empty.

BARN OWL (*Strix pratincola*).

Chickamauga, Tenn	Nov. 27, 1885		Cowbird; sparrow.		
Chester County, Pa	May 21, 1886			Meadow mice	
Do	Dec. 8, 1886	Pigeon			
Dixon County, Nebr	Aug., 1867			Mouse	39 locusts; 22 other insects.
Dakota County, Nebr	July, 1868				55 insects.
Lancaster Co., Nebr	June, 1872			Mouse	40 insects.
Gainesville, Fla	Feb. 4, 1887			2 cotton rats; 2 shrews.	

Summary.—Of 7 stomachs examined, 1 contained poultry; 1, other birds; 4, mice; 1, other mammals; 3, insects.

LONG-EARED OWL (*Asio wilsonianus*).

Cohuila Valley, Cal	Apr. 1, 1886			2 pocket mice	
Washington, D. C	Mar. 27, 1887		Song sparrow	Meadow mouse	
Sheepshead Bay, L. I., N. Y.	Nov. 2, 1886		Junco; kinglet	do	
Washington, D. C	Mar. 16, 1887				Empty.
Sandy Spring, Md	Mar. 8, 1887				Do.
Do	Mar. 12, 1887			Meadow mouse	
Do	Mar. 18, 1887				Do.
Do	Nov. 19, 1887				Do.
Do	Jan. 7, 1888			2 meadow mice	
Chester County, Pa	Jan. 11, 1887			Meadow mouse; 3 house mice.	
Do	Nov. 20, 1886			Meadow mouse	
Do	Dec. 11, 1886			do	
Do	Jan. 28, 1887			2 meadow mice	
Do	do			White-footed mouse; meadow mouse.	
Do				Meadow mouse	
Do	Dec. 13, 1886			White-footed mouse; 2 meadow mice; shrew.	
Woodstock, Conn	June, 1887			4 meadow mice	
Boston, Mass	Oct. 13, 1887		Sparrow; warbler.	Meadow mouse	
Montgomery Co., Pa	Dec. 26, 1887			do	
Sing Sing, N. Y	Apr. 29, 1880		Goldfinch; 2 sparrows.	Mouse	
Do	do			2 mice	
Do	do		Small bird	do	
Chester County, Pa	Nov. 25, 1886			Mice	
Do	Nov. 10, 1878			do	
Do	Dec. 30, 1884			do	
Westtown, Pa	Feb. 23, 1879			do	
Do	do			do	
Do	do			do	
Chester County, Pa	do			do	
Do	do			do	
Do	do			do	
Do	do			do	
Do	Nov. 22, 1880			do	
Do	Dec. 5, 1879			do	
Do	Feb. 25, 1880			do	
Do	do			do	

Statement of the stomach contents of more than 1,000 *Hawks and Owls*—Continued.

LONG-EARED OWL (*Asio wilsonianus*)—Continued.

Locality.	Date.	Poultry or game birds.	Other birds.	Mammals.	Miscellaneous.
Chester County, Pa	Feb. 25, 1880			Mice	
Do	do			do	
Do	do			do	
Dakota County, Nebr	July, 1865			Rabbit	Few insects.
Elmira, N. Y	Aug. 5, 1885			Field mice	
Do	Aug. 12, 1885			do	
Do	Oct. 13, 1886			do	
Do	do			do	
Nichols, N. Y	July 4, 1887				Empty.
Tioga, Pa	Sept. 2, 1887			Field mice	
Elmira, N. Y	Dec. 21, 1887	Quail			

Summary.—Of 47 stomachs examined, 1 contained a game bird, 5, other birds; 40, mice; 2, other animals; 1, insects; and 5 were empty.

SHORT-EARED OWL (*Asio accipitrinus*).

Washington, D. C	Nov. 22, 1886		2 juncos; 1 fox sparrow.		
Oakdale, N. Y	Nov. 27, 1886			Mouse	
Rockville, Conn	Oct. 22, 1886			2 meadow mice.	
Do	do			Mouse hair	
Koshkonong, Wis	Sept. 25, 1886			Meadow mouse.	
Washington, D. C	Apr. 20, 1887			3 meadow mice.	
Hillsborough, New Brunswick.	S pt. 3, 1887			2 meadow mice.	
Washington, D. C	Jan., 1887			1 meadow mouse	
Do	Mar. 28, 1887		Robin		
Hackensack, N. J	Mar. 31, 1887			2 meadow mice; 1 shrew.	
South Windsor, Conn	Mar. 29, 1887		Sparrow	2 meadow mice.	
Do	do			do	
Do	Nov. 4, 1887			do	
Do	do			5 meadow mice.	
Do	do			4 meadow mice.	
Washington, D. C	Jan. 23, 1888			1 meadow mouse	
Glastonbury, Conn	Nov. 23, 1886				Empty.
Do	do				Do.
East Hartford, Conn	Nov. 11, 1886			4 meadow mice.	
Do	Nov. 2, 1886			3 meadow mice.	
Sandy Spring, Md	Jan. 28, 1887			Meadow mouse.	
Do	Mar. 5, 1887			Mouse	
Do	do				Do.
Do	do				Do.
Do	do			Mouse	
Do	Jan. 7, 1888			2 meadow mice.	
Do	Feb. 13, 1888				Do.
Chester County, Pa	Jan. 25, 1887			Meadow mouse.	
Do	Dec. 21, 1886			do	
Do	Dec. 10, 1886			Pine mouse	
Do	Nov. 20, 1886			3 meadow mice.	
Do	Nov. 25, 1886			1 meadow mouse	
Do	Nov. 27, 1886		Feathers		
Do	Dec. 8, 1886			Meadow mouse.	
Do	Mar. 5, 1887				Do.
Do				Mice	
Do	Jan. 4, 1880			do	
Do	Jan. 5, 1880			do	
Dakota County, Nebr	July, 1870			Rabbit	17 insects.
Lincoln, Nebr	Sept., 1868			Gopher	30 locusts.
Elmira, N. Y	Aug. 13, 1884			Field mice	Beetle.
Do	Aug. 3, 1886			do	Do.
Do	Aug. 7, 1886			do	Do.
Erin, N. Y	Oct. 5, 1887			do	Do.
Do	Dec. 29, 1887			do	Do.

Summary.—Of 45 stomachs examined, 4 contained small birds; 34, mice; 3, other mammals; 7, insects; and 6 were empty.

Statement of the stomach contents of more than 1,000 *Hawks and Owls*—Continued.

BARRED OWL (*Syrnium nebulosum*).

Locality.	Date.	Poultry or game birds.	Other birds.	Mammals.	Miscellaneous.
Englewood, N. J.	Feb. 22, 1886			Meadow mouse.	
Alfred Centre, N. Y.	Oct. 22, 1886			Red squirrel	
Whitewater, Wis	Aug. 30, 1886				Empty.
Washington, D. C.	Feb. 15, 1887				Do.
Do.	Mar. 16, 1887			Shrew	Frog; 8 larvæ.
Greensborough, Ala	Nov. 15, 1887				Spider; grasshoppers; crickets.
Moose River, N. Y	June 10, 1878			12 red-backed mice.	
Sing Sing, N. Y	Nov. 27, 1882	Fowl			
Do.	Jan. 21, 1885			2 meadow mice.	
Do	Mar. 21, 1885		Saw-whet owl		
Saint Louis, Mo.	Spring, 1885		Screech owl		
Eubanks, Ky.	Mar. 21, 1887			Meadow mice; rabbit.	
Greensborough, Ala	Nov. 12, 1887				Empty.
Sandy Spring, Md	Apr. 25, 1887				Crawfish.
Do.	Nov. 14, 1887			4 meadow mice.	
Do.	Nov. 28, 1887		Screech owl		
Do.	Feb. 11, 1888				Empty.
Do.	Feb. 18, 1888			Meadow mouse.	
Do.	Feb. 19, 1888			Rabbit	
Chester County, Pa.	Dec. 10, 1886			Flying squirrel.	
Do.	Dec. 16, 1886			Rabbit	
Do.				Mice	
Do.	Jan., 1889			do	
	Jan. 17, 1881			do	
Elmira, N. Y.	Aug. 1, 1885				Frog; crawfish.
Do.	Aug. 7, 1886			Several mice	
Waverly, N. Y.	Sept. 4, 1887			Mice	Insects.
Barton, N. Y.	Oct. 17, 1886			Field mice	
Halsey Valley, N. Y.	Oct. 5, 1887				Fish; insects.
Elmira, N. Y.	Nov. 4, 1884			Mice	
Tyrone, N. Y.	Nov. 13, 1887				Empty.
Elmira, N. Y.	Dec. 1, 1886			Weasel	
Caton, N. Y.	Jan. 1, 1885			Mice	
Tioga, N. Y	Feb. 9, 1886			Field mouse; mole.	
Elmira, N. Y.	Feb. 19, 1887		Small birds		
Do.	Mar. 3, 1886			Field mice	
Alexandria, Va	Apr. 17, 1888				Do.

Summary.—Of 37 stomachs examined, 1 contained poultry; 4, other birds; 16, mice; 8, other mammals; 2, frogs; 4, insects; 1, spider; 2, crawfish; 1, fish; and 6 were empty.

FLORIDA BARRED OWL (*Syrnium nebulosum alleni*).

Gainesville, Fla.	Apr. 20, 1887				Frog; crawfish; Grasshoppers; larvæ; beetle.
Do.	May 9, 1887				Lizard.
Do.	Dec. 29, 1887			Mouse	
Do.	Feb. 19, 1888			do	

Summary.—Of 4 stomachs examined, 2 contained mice; 2, batrachian and reptile; 1, insects; 1 crawfish.

SAW-WHET OWL (*Nyctala acadica*).

Taunton, Mass.	Dec. 11, 1885			Mouse hair	
East Hartford, Conn	Jan. 7, 1887			White-footed mouse.	
Hillsborough, N. B.	Oct. 21, 1886			Mouse hair	
Flatbush, N. Y.	Nov. 3, 1887			House mouse	
Locust Grove, N. Y.	Jan. 24, 1884			Meadow mouse.	
Sing Sing, N. Y.	Jan. 13, 1885			do	

Summary.—Of 6 stomachs examined, all contained mice.

Statement of the stomach contents of more than 1,000 *Hawks and Owls*—Continued.

SCREECH OWL (*Megascops asio*).

Locality.	Date.	Poultry or game birds.	Other birds.	Mammals.	Miscellaneous.
Sing Sing, N. Y.	Aug. 31, 1885				Remains.
Atlanticville, N. Y.	Dec. 4, 1885			Mouse hair	
Sing Sing, N. Y.	Sept. 25, 1886				Do.
Washington, D. C.	Nov., 1886			Meadow mouse.	
Do	....do			2 white-footed mice.	Do.
Do	....do				Do.
Do	....do				Do.
Do	....do			Mouse hair	Do.
Do	....do		Tree sparrow		
Do	....do				Do.
Do	....do		Feathers		
Do	....do			Mouse hair	
Do	....do				Do.
River Vale, N. J.	Nov. 20, 1885				Larvæ.
Bergen County, N. J	Nov. 26, 1885			House mouse	
Alfred Centre, N. Y.	Oct. 10, 1886			White-footed mouse.	Grasshopper; crickets; crawfish.
Peterborough, N. Y.	Sept. 11, 1886		Sparrow	....do	Grasshoppers.
Amherst, Mass.	July 8, 1886				Frog; remains.
Cleveland, Ohio	Mar. 12, 1886			Meadow mouse	
East Hartford, Conn.	June 23, 1886		3 small birds		7 beetles.
Gainesville, Fla	Mar. 12, 1887				Grasshoppers; larvæ of beetles.
Washington, D. C.	Jan., 1887			White-footed mouse; meadow mouse.	
Do	....do			2 meadow mice.	
Do	....do		Screech owl		
Do	....do		....do		
Do	Feb. 15, 1887			Mouse	
Rockville, Conn.	May 28, 1887				Empty.
Do	....do				Beetle.
Portland, Conn	Oct. 22, 1886				Spider.
Do	Dec. 23, 1886	Pigeon			
Lockport, N. Y	Jan. 7, 1888				Crawfish.
Portland, Conn	May 5, 1887				7 May beetles.
Washington, D. C.	Feb. 13, 1887			2 pine mice	
East Hartford, Conn.	July 16, 1886		2 English sparrows.		
Philadelphia, Pa	Apr. 20, 1886				May beetles.
Greensborough, Ala					2 cicadæ.
Sandy Spring, Md.	Mar. 2, 1887				Insects.
Do	....do			2 mice	
Chester County, Pa.	Jan. 11, 1886			Mouse hair	
Do	Jan. 5, 1886			House mouse	
Do	Apr. 22, 1886		Feather		Beetle
Do	Jan. 7, 1887		Feathers		
Do	Jan. 8, 1887			House mouse	
Do	Nov. 10, 1887			Meadow mouse.	
Do	1876			Meadow mouse; house mouse.	
Do	Nov. 27, 1886			White-footed mouse.	
Do	....do				Empty.
Do	Dec. 6, 1886			Meadow mouse.	
Do	Dec. 10, 1886				Beetles.
Do	....do				Empty.
Do	Feb. 12, 1887				Indeterminate matter.
Do	Feb. 9, 1887			House mouse	
Do	Feb. 18, 1887			....do	
Do	Jan. 15, 1887			....do	
Do	Jan. 17, 1887			....do	
Do	Dec. 27, 1886			Mouse hair	
Do	Jan. 11, 1887			House mouse	
Do	Feb. 9, 1887				Trace.
Do	Feb. 10, 1887				Empty.
Do	Jan. 17, 1887			Mouse hair	
Do	Feb. 11, 1887				Do.
Do	June 7, 1884				Insects.
Do	Jan. 8, 1885				Do.
Do	Jan. 6, 1885				Do.
Do	Dec. 18, 1886		English sparrow	Mice	
Do	Nov. 17, 1880		+	+	
Do	Nov. 26, 1880			Mice	
Do	Aug. 20, 1876				Grasshoppers.
Delaware County, Pa.	Dec. 5, 1879			Mice	

Statement of the stomach contents of more than 1,000 *Hawks and Owls*—Continued.

SCREECH OWL (*Megascops asio*)—Continued.

Locality.	Date.	Poultry or game birds.	Other birds.	Mammals.	Miscellaneous.
Cedar County, Nebr....	Sept., 1867	.....	.....	.....	47 locusts; 12 other insects.
Do.....	.....do.....	.....	Small bird.....	.....	32 locusts; 8 other insects.
Do.....	June, 1868	.....	.....	.....	41 locusts; 22 other insects.
Dakota County, Nebr...	July, 1869	.....	.....	Mouse	69 insects.
Do.....	Aug., 1870	.....	.....	....do	38 insects.
Seward County, Nebr...	Sept., 1872	.....	.....	.....	67 insects.
Nemaha County, Nebr..	Sept., 1874	.....	.....	.....	50 locusts; 16 other insects.
Lancaster Co., Nebr....	June, 1875	.....	.....	.....	49 locusts; 15 other insects.
Elmira, N. Y.....	Jan. 29, 1886	.....	English sparrow	Mice..... ...	
Do.....	Jan. 30, 1886	.....	Feathers	....do	
Horseheads, N. Y.....	Feb. 4, 1886	.....	English sparrow	.....	
Chemung, N. Y.....	Mar. 7, 1886	.....	.....	Field mice.....	
Elmira, N. Y.....	Mar. 21, 1886	.....	.....	Mice (?).....	
Barton, N. Y.....	Apr. 13, 1887	.....	Junco	.....	
Waverly, N. Y.....	Apr. 15, 1886	.....	.....	.....	Insects.
Tioga, Pa.....	Oct. 5, 1886	.....	.....	Mice.....	
Wellsborough, Pa	Oct. 8, 1887	.....	English sparrow	.....	
Elmira, N. Y.....	Oct. 21, 1886	.....	Shore lark.....	.....	
Do.....	Oct. 23, 1886	.....	.....	Mice.....	
Do.....	Oct. 25, 1887	.....	English sparrow	.....	
Wellsburgh, N. Y	Nov. 2, 1886	.....	.....	.....	Empty.
Caton, N. Y.....	Dec. 24, 1887	.....	English sparrow	.....	
Washington, D. C.....	Mar. 25, 1888	.....	.....	Meadow mouse.	Crawfish.
Do.....	....do.....	.....	.....	.....	Empty.
West Chester, Pa.....	Jan. 6, 1887	.....	.....	House mouse ..	

Summary.—Of 94 stomachs examined, 1 contained poultry; 20, other birds; 41, mice; 1, other mammal; 1, frog; 35, insects; 3, crawfish; 1, spider; 1, indeterminate matter; and 7 were empty.

GREAT HORNED OWL (*Bubo virginianus*).

Chattanooga, Tenn.....	Dec. 25, 1885	Quail ...	.....	.....	
New London, Wis.....	Oct. 25, 1886	.....	.....	Fox squirrel	
Chester County, Pa.....	May 11, 1886	Guinea fowl.	.....	.....	
Adairsville, Ga	May 20, 1886	.....	... ...	.....	Beetle.
Lockport, N. Y.....	Jan. 2, 1887	Fowl ...	.....	.....	
Do.....	.....	...do	.....	.....	
East Hartford, Conn....	June 16, 1887	...do	.....	Rabbit	
Sing Sing, N. Y.....	Jan. 19, 1883	Guinea fowl.	.....	.....	
Do.....	July 9, 1884	Fowl ...	Robin	.....	
Do.....	Nov. 12, 1884	.....	.....	Shrew	
Do...	Feb. 26, 1885	.....	.....	Rabbit.....	
Paint Rock, Tex.....	Apr. 23, 1887	.....	Cooper's hawk; lark-finch; mockingbird.	.....	
Sandy Spring, Md.....	Mar. 12, 1887	Pigeon..	.....	Meadow mouse.	
Chester County, Pa.....	Feb. 15, 1886	.....	.....	Rabbit.....	
Do.....	Sept., 1878	+	.....	.....	
Dakota County, Nebr...	July, 1869	.....	.....	Gopher	30 insects.
Elmira, N. Y.....	Oct. 4, 1885	.....	.....	Skunk	
Do.....	Oct. 7, 1886	Ruffed grouse.	.....	.....	
Corning, N. Y	Aug. 15, 1884	.....	.....	Gray squirrel...	
Tyrone, N. Y...	Sept. 4, 1886	Poultry	.....	.....	
Elmira, N. Y.....	Nov. 5, 1885	...do	.....	.....	
Breesport, N. Y	Nov. 2, 1886	.....	.....	Rabbit.....	
Canton, Pa	Dec. 13, 1884	.....	.....	Skunk	
Tioga, Pa.....	Dec. 15, 1884	.....	.....	Weasel (?)	
Gaines, Pa.....	Dec. 29, 1885	Ruffed grouse.	.....	.....	
Elmira, N. Y	Jan. 3, 1884	Poultry	.....	.....	
Do.....	Jan. 5, 1885	.....	.....	.....	Empty.
Big Flats, N. Y	Jan. 17, 1886	Poultry	.....	.....	
Erin, N. Y.....	Jan. 29, 1887	Ruffed grouse.	.....	.....	
Sandy Spring, Md.....	Apr. 7, 1888	.....	.....	Rabbit.....	

Summary.—Of 30 stomachs examined, 16 contained poultry or game birds; 2, other birds; 1, mice; 12, other mammals; 2, insects; and 1 was empty.

Statement of the stomach contents of more than 1,000 *Hawks and Owls*—Continued.

SNOWY OWL (*Nyctea nyctea*).

Locality.	Date.	Poultry or game birds.	Other birds.	Mammals.	Miscellaneous.
Washington, D. C.	Nov. 11, 1885				Empty.
Portland, Conn	Nov. 20, 1885				Do.
Keokuk, Iowa	Dec. 6, 1886	Prairie hen.		Meadow mouse.	
Lockport, N. Y.	Nov. 17, 1886				Do.
Do	do				Do.
Chester County, Pa.	Dec. 14, 1886			House rat	

Summary.—Of 6 stomachs examined, 1 contained game bird; 2, mice; and 4 were empty.

HAWK OWL (*Surnia ulula caparoch*).

Quebec, Canada	Jan. 15, 1886			Meadow mouse.	

Summary.—The 1 stomach examined contained a mouse.

BURROWING OWL (*Speotyto cunicularia hypogœa*).

Fort Buford, Dak	Sept. 29, 1887				Grasshoppers.
Wayne Co., Nebr.	June, 1868				62 insects.
Do	do				Lizard; 30 insects.
Pierce Co., Nebr.	do				49 locusts; 17 other insects.
Do	do			Prairie dog	46 locusts; 10 other insects.
Do	do				54 locusts; 8 other insects.
Wayne County, Nebr.	July, 1869			Mouse	65 insects.
Sydney, Cheyenne County, Nebr.	June, 1875				59 locusts; 3 other insects.
Ogalalla, Keith County, Nebr.	Sept., 1876			Mouse	51 locusts; 12 other insects.
Do	do				58 locusts; 4 other insects.

Summary.—Of 10 stomachs examined, 2 contained mice; 1, other mammal; 10, insects.

SUMMARY OF STOMACHS EXAMINED.

Swallow-tailed Kite (*Elanoides forficatus*)	5
Mississippi Kite (*Ictinia mississippiensis*)	2
Marsh Hawk (*Circus hudsonius*)	46
Sharp-shinned Hawk (*Accipiter velox*)	48
Cooper's Hawk (*Accipiter cooperi*)	46
Goshawk (*Accipiter atricapillus*)	6
Red-tailed Hawk (*Buteo borealis*)	311
Red-shouldered Hawk (*Buteo lineatus*)	102
Swainson's Hawk (*Buteo swainsoni*)	4
Broad-winged Hawk (*Buteo latissimus*)	22
Rough-legged Hawk (*Archibuteo lagopus sancti-johannis*)	28
Golden Eagle (*Aquila chrysaëtos*)	1
Bald Eagle (*Haliœetus leucocephalus*)	6
Prairie Falcon (*Falco mexicanus*)	1
Duck Hawk (*Falco peregrinus anatum*)	5
Pigeon Hawk (*Falco columbarius*)	19
Sparrow Hawk (*Falco sparverius*)	133
Total number of hawks	785
Barn Owl (*Strix pratincola*)	7
Long-eared Owl (*Asio wilsonianus*)	47
Short-eared Owl (*Asio accipitrinus*)	45
Barred Owl (*Syrnium nebulosum*)	37
Florida Barred Owl (*Syrnium nebulosum alleni*)	4
Saw-whet Owl (*Nyctala acadica*)	6
Screech Owl (*Megascops asio*)	94
Great Horned Owl (*Bubo virginianus*)	30
Snowy Owl (*Nyctea nyctea*)	6
Hawk Owl (*Surnia ulula caparoch*)	1
Burrowing Owl (*Speotyto cunicularia hypogœa*)	10
Total number of owls	287
Total number of hawks	785
Total number of hawks and owls	1,072

EXPERIMENTS IN POISONING.

By Dr. A. K. Fisher, *Assistant Ornithologist.*

So little definite information is available concerning practical methods of destroying injurious species of birds and mammals by poisons, and so many letters of inquiry have been received by the Department asking for detailed instructions on the subject, that it has been found necessary to conduct a series of experiments in order to obtain the desired information. It was important to determine not only what poison is most efficient and best adapted for the purpose, but also the most economical poison, the quantity necessary for use, and the simplest method of preparation. As an easily accessible and hardy bird, and one which could be procured in any desired numbers, the English Sparrow was selected as the first species to be experimented upon. A large number of healthy English sparrows were secured and confined in large cages. They were given an abundance of food and water during the time covered by the experiments, so that they might not be forced from hunger to partake of the poisoned grain.

POISONS USED IN THE EXPERIMENTS.

The following poisons were used in the experiments:

Strychnine.
Arsenic.
Corrosive sublimate.

Of strychnine, two preparations were used:

Crystals of strychnine.
Tincture of nux vomica.

Of arsenic, the following preparations were used

Arsenious oxide (white arsenic).
Arsenite of copper (Paris green).
Arsenite of calcium (London purple).
Arseniate of soda.
Liq. Potassii arsenitis (Fowler's solution).

POISONS RECOMMENDED.

The results of these experiments have led to the recommendation of the following formulæ as simple, efficacious, and inexpensive:

Arsenic.—One part by weight of white arsenic to fifteen parts of corn meal or grain. (Paris green and London purple would be just as valuable as white arsenic, except for their bright color, which arouses the sparrow's suspicion.)

Directions.—If corn meal is used, the arsenic should be stirred in dry, and the mixture afterward moistened. It should be fed moist. If whole grain is used, it should be moistened before stirring in the arsenic. It will be found advantageous to add a little gum arabic to the water used to moisten the grain, as it causes the poison to adhere more firmly to the kernels. It should be dried before using. Wheat is preferable to all other grain, because the sparrows feed upon it more eagerly.

Strychnine.—Dissolve 2 grams of strychnine in a liter of hot water. (Ordinarily strychnine is put up in bottles containing one-eighth of an ounce. Half of the contents of one of these bottles, dissolved in a quart of hot water, gives a solution of the desired strength.)

Directions.—To insure the best results it is necessary to soak the grain in the poison solution at least forty-eight hours. It should then be dried. Grain prepared in this way may be kept in jars, to be used as required.

Corrosive sublimate, cyanide of potassium, phosphorus, and a number of other poisons, although efficient, can not be recommended on account of the danger attending their use.

GENERAL SUGGESTIONS.

In dealing with as suspicious a bird as the English Sparrow, in cases where the continued use of the poison is required, a slow poison (such as arsenic) is preferable to one of rapid action (such as strychnine), for the reason that the effects of the latter may become apparent in certain individuals while the birds are still feeding, the peculiar actions of the affected birds frightening the others away before they have taken enough of the poisoned grain to insure fatal results. In such cases it has been observed that the frightened birds never return to the grain.

Before putting out poison for sparrows, the birds should be baited to a certain locality. At the same hour each day they should be fed with the same kind of grain that subsequently is to be used as the vehicle for the poison.

PRECAUTIONS.

In the use of poisons the utmost caution is necessary to prevent the possibility of accident from the poison itself, or from the grain employed as a vehicle for the poison. The following precautions should be observed: (1) All vessels containing poison or poisoned grain, and those in which the same are mixed, should be labeled with the word *Poison*, in large letters; (2) all vessels containing poison or poisoned grain should be kept out of reach of children and domesticated animals; (3) in preparing and exposing poisoned grain, great care should be taken to avoid spilling any of it where it might be found by children, farm animals, or poultry.

Another possible source of danger in the use of poisons, and one that is much less easy to guard against, arises from the fact that the bodies of the poisoned birds are liable to fall where they may be picked up and eaten by man or beast. However, very little real danger is to be apprehended from this source.

SYNOPSIS OF EXPERIMENTS.

Following is a brief synopsis of the experiments in poisoning made by the division:

EXPERIMENTS WITH STRYCHNINE.

No. 1. (1 bird.) Fed on wheat soaked one and a half hours in a solution of strychnine (.65 of a gram to 30 c. c. of cold water) and dried. Bird commenced eating at 1.16 p. m. At 1.27 p. m. showed first symptoms. At 3.10 p. m. it had apparently nearly recovered. Next morning it was dead. Stomach and crop contained 9 kernels of wheat.

No. 2. (1 bird.) Fed on hemp seed soaked twenty-four hours in a solution of strychnine (.325 of a gram to 30 c. c. of cold water) and dried. Bird commenced eating at 11.35 a. m.; died at 12.20. Crop contained 3 shelled hemp seeds; stomach none.

No. 3. (3 birds.) Fed on hemp seed soaked twenty-four hours in a solution of strychnine (.65 of a gram to 30 c. c. of cold water) and dried. Commenced feeding at 12.15 (it is impossible to say that all three commenced at that time). Bird No. 1 died at 12.42. Crop contained 3 shelled hemp seeds; none in stomach. Bird No. 2 at about 1 o'clock showed first symptoms while eating; at 3.10, however, it had partially recovered. It was dead the next morning. Stomach and crop contained 4 to 5

kernels. Bird No. 3 ate the poisoned hemp seed and non-poisoned wheat until 3.10 p. m., seemingly without bad results. It was dead next morning. Three kernels of hemp seed were all that could be discovered in the stomach and crop, which contained also 10 to 12 kernels of non-poisoned wheat.

No. 4. (2 birds.) Fed on wheat soaked forty-five hours in a solution of strychnine (.325 of a gram to 30 c. c. of cold water) and dried. Commenced eating at 10.20; both dead at 11.05. Each had eaten 3 kernels of wheat.

No. 5. (1 bird.) Fed same as above. Commenced eating at 12.30; died at 1.14 p. m. Stomach contained wheat partially digested; nothing in crop.

No. 6. (1 bird.) Fed on oats soaked twenty hours in a solution of strychnine (.65 of a gram to 30 c. c. of cold water) and not dried. Bird commenced eating about 11 o'clock, but seemed not to relish the food. At 11.20 the bird was unsteady in its movements, but at 3.45 it was in good condition. Next morning had wholly recovered; probably did not eat enough of the poisoned grain.

No. 7. (2 birds.) Fed on non-poisoned hemp seed and wheat, and given water to drink containing .325 of a gram of sulp. strychnine to 30 c. c. of water. Four hours afterward they were visited, and both were found dead and cold.

No. 8. (5 birds.) Fed on wheat soaked for forty-eight hours in a solution of strychnine (.16 of a gram to 30 c. c. of water). Commenced eating at 11.45 a. m. At 1.45 p. m. two were dead. At 2 p. m. the third was dead. At 3 p. m. the fourth was dead. The last was found dead the next morning.

No. 9. (2 birds.) Fed on wheat soaked for forty-eight hours in solution of strychnine (.065 of a gram to 30 c. c. of water). Commenced eating at 10 a. m. First bird died at 10.45. Its stomach and crop contained 10 kernels of wheat. At 11.10 the second bird died. Its crop contained 4 kernels; stomach empty.

No. 10. (5 birds.) Fed on wheat soaked forty-eight hours in solution of strychnine (.03 of a gram to 30 c. c. of water). Commenced eating at 1 p. m. At 2 p. m. the first bird was dead, and another badly affected, but recovered. Two were dead next morning. The fifth bird was not affected; probably did not eat enough. This solution would seem to be too weak to give certain results.

EXPERIMENTS WITH TINCTURE OF NUX VOMICA.

No. 11. (3 birds.) Fed on wheat soaked twenty-four hours in tincture of nux vomica and dried. At 10.30 a. m. one bird eating; at 10.55 affected; at 1.15 p. m. symptoms passing off; recovered. At 1.15 p. m. second bird dead; stomach contained 8 kernels of wheat; crop empty. Another bird commencing to eat at 11 a. m.; died at 1.10 p. m.; stomach contained 4 kernels of wheat; crop none.

EXPERIMENTS WITH CORROSIVE CHLORIDE OF MERCURY (CORROSIVE SUBLIMATE).

No. 12. (2 birds.) Fed on wheat soaked twenty-four hours in a saturated solution (in water) of corrosive sublimate and dried. Birds commenced to eat at 10.30 a. m. First bird died at 1.15 p. m.; stomach and crop empty. Second bird died at 3 p. m.; 2 kernels of wheat in stomach; crop empty.

EXPERIMENTS WITH WHITE ARSENIC.

No. 13. (1 bird.) Fed on Indian meal and white arsenic (15 to 1) mixed with a little water. Commenced to eat immediately (9.45 a. m.). At 3.45 bird still in good spirits. Dead next morning. Stomach and crop empty.

No. 14. (1 bird.) Fed same as No. 13. Commenced to eat at 9.30 a. m.; badly affected at 2 p. m.; dead at 2.54 p. m. Stomach and crop empty.

No. 15. (3 birds.) Fed same as Nos. 13 and 14. Commenced to eat at 8.45 a. m. At 3 p. m. two affected and one seemed in good spirits. All were dead next morning. Stomachs and crops empty.

No. 16. (2 birds.) Fed on Indian meal and white arsenic (15 to 2), moistened. Commenced to eat at 10.30 a. m. First bird died at 3 p. m. Stomach and crop empty. Second bird affected at 3.20; dead next morning.

EXPERIMENTS WITH ARSENIATE OF SODA.

No. 17. (1 bird.) Fed on hemp seed soaked one and a half hours in a solution of arseniate of soda (1.56 grams to 30 c. c. water) and dried. The bird ate freely, but recovered.

No. 18. (1 bird.) Fed on hemp seed soaked one and a half hours in a solution of arseniate of soda (2.10 grams to 30 c. c. water) and dried. Dead (time not taken). Stomach and crop contained 12 hemp seed.

No. 19. (2 birds.) Fed on wheat soaked three hours in a solution of arseniate of soda (2.10 grams to 30 c. c. water) and dried. Commenced to eat at 9.30 a. m. First bird dead at 10.35 a. m.; crop empty; stomach contained four kernels. Second bird dead at 2.35 p. m.; crop and stomach empty.

EXPERIMENT WITH LIQUOR POTASSII ARSENITIS (FOWLER'S SOLUTION).

No. 20. (2 birds.) Fed on wheat soaked seventy-two hours in Fowler's solution of arsenic (liq. Potassii arsenitis). Commenced eating at 10 a. m.; lively at 4 p. m. Both dead next morning.

EXPERIMENTS WITH ARSENITE OF CALCIUM (LONDON PURPLE).

No. 21. (1 bird.) One hungry bird exposed to ground hemp seed and London purple (15 to 1) for five hours, but would not touch it on account of its marked color.

NOTE.—When mixed with whole grain the color is not so conspicuous. (See next experiment.)

No. 22. (3 birds.) Fed on wheat and London purple (15 to 1) stirred up with a little gum-arabic water and then dried. Commenced eating at 9.45 a. m. First one dead at 3.30 p. m.; stomach and crop empty. Second and third badly affected at 3.30 p. m.; dead next morning; stomach and crop empty.

EXPERIMENTS WITH ARSENITE OF COPPER (PARIS GREEN).

No. 23. (3 birds.) Three hungry birds exposed to ground hemp seed and Paris green for four hours, and refused to eat it on account of its bright color.

No. 24. (3 birds.) Fed on wheat and Paris green (15 to 1) stirred up with a little gum-arabic water and then dried. Commenced to eat at 9.45 a. m. First bird dead at 3.30 p. m.; stomach and crop empty. Second and third birds badly affected at 3.30 p. m.; dead next morning; stomachs and crops empty.

REPORT ON SOME OF THE RESULTS OF A TRIP THROUGH PARTS OF MINNESOTA AND DAKOTA.

By VERNON BAILEY, *Field Agent.*

Mr. Bailey was employed by the division to make field investigations in Minnesota and Dakota for the purposes set forth in the accompanying letters of instruction:

UNITED STATES DEPARTMENT OF AGRICULTURE,
COMMISSIONER'S OFFICE,
Washington, D. C., May 4, 1887.

SIR: You are hereby appointed a special field agent of the Division of Economic Ornithology and Mammalogy of this Department, * * * your appointment to date from May 10, instant.

You will set out on an expedition for the purpose of investigating the food habits and distribution of the mammals and birds of certain parts of Minnesota and Dakota. You will proceed direct to Round Lake, Nobles County, Minn., to investigate the damages inflicted upon the newly-planted corn by Blackbirds, of which grievous complaints have been made to me by the farmers of that region. You will determine the species which occasion the damage, examine their breeding-grounds, and suggest such measures as you may deem practicable for the relief of the losses they sustain. From Round Lake you will proceed to Heron Lake (Jackson County) for the purpose of ascertaining positively what species of birds breed at that place, concerning which very remarkable reports have reached the Department. From Heron Lake you will cross the boundary into Dakota, and work northward to the Fort Sisseton Indian Reservation and the Traverse Lake region (including Big Stone Lake), on the boundary line, visiting points on both shores. Thence proceed north, in the Red River valley, to Pembina, collecting as much information as possible concerning the depredations of Gophers in that region, and determining in each case which species of Gopher is responsible for the injury. Throughout the trip you will make a special study of the habits of the peculiar in-

sectivorous Mouse, known as the Missouri Grasshopper Mouse (*Hesperomys leucogaster*).

From Pembina you will proceed, if practicable, to the Turtle Mountain region, and thence to Forts Berthold and Buford on the Missouri. If this route is not practicable, you will proceed from Pembina to Devil's Lake (in Ramsey and Benson Counties); thence to old Fort Berthold, and thence to Fort Buford. Before leaving this part of Dakota you will visit the arid area, and will ascend the Little Missouri as far as practicable. Thence proceed by the most direct available route to the Black Hills of Dakota. It may be necessary to descend the Missouri to Fort Abraham Lincoln, and thence, by the old post-road, proceed to Fort Meade. You will visit some of the higher mountains of the Black Hills and determine their fauna. Thence proceed to the "Bad Lands," and the "Sand Hill Desert" just south of it, remaining long enough at each place to learn the peculiarities of its fauna, and the principal food of the species which live there.

You will receive detailed instructions for your routine field work from the Ornithologist of this Department.

Respectfully,

NORMAN J. COLMAN.
Commissioner.

VERNON BAILEY, Esq.,
Elk River, Minn.

UNITED STATES DEPARTMENT OF AGRICULTURE,
DIVISION OF ECONOMIC ORNITHOLOGY AND MAMMALOGY,
Washington, D. C., May 5, 1887.

DEAR SIR: In obedience to your commission, which this letter accompanies, you will set out for Round Lake, Minn., on the 10th instant, for the special purpose of investigating the damage done the newly-planted corn crop by Blackbirds. If on your arrival at Round Lake you learn that the season is so backward that corn will not be up for a week or ten days, you will proceed at once to Heron Lake (for the purpose specified in your commission).

Unless you find a particularly promising locality in southeastern Dakota you had better proceed at once to Fort Sisseton and the Traverse Lake region, where you ought to stay about two weeks.

* * * * * * *

Before leaving any locality at which you have stopped a few days give a brief account of the more important physical features of the place. This will help explain any peculiarities which the species found there may suggest.

You will make a collection of the stomachs and gizzards of birds, in accordance with instructions contained in Circular 4, of which a copy is inclosed.

Respectfully,

C. HART MERRIAM,
Ornithologist.

Mr. VERNON BAILEY,
Elk River, Minn.

Supplementary instructions were sent from time to time, but the above sufficiently cover the objects and general direction of the expedition.

Mr. Bailey was in the field about five months, during which time he made a valuable collection of the stomachs of birds and mammals of economic importance, and secured much useful information concerning their food habits and distribution. His report is too bulky to be printed as a whole, hence portions relating to Blackbirds and mammals, together with his descriptions of the localities visited, have been selected and arranged for publication as a part of the present report. For the determination of the specimens collected, and for the nomenclature employed, the ornithologist of this department is responsible.

BLACKBIRDS.

Yellow-headed Blackbird (*Xanthocephalus xanthocephalus*).

Heron Lake, Jackson County, Minn., May 14, 1887.—These birds are very numerous here, and do more damage to crops than at Round Lake. No corn can be raised on account of them, and it is hard work to get a crop of wheat, oats, or flax, without more or less injury from them.

The species of Blackbirds most numerous here, and of which most complaint is made, are the Yellow-headed and Red-winged. The Purple Grackle, Cowbird, and Bobolink are present, but in less numbers; consequently the damage they do is not of so much importance. The Yellow-heads and Red-wings seem to be in about equal numbers and of much the same habits, nesting in company among the reeds and coarse grass of the slough and borders of lakes. Their nests are almost always placed in bunches of grass surrounded by water; this is of importance, because where there are no suitable breeding places there are no blackbirds. The reason the blackbirds are so numerous here evidently is because the prairies contain a great many sloughs or wet marshes, with coarse grass and reeds growing in and around them. Here the birds build their nests, going to the surrounding fields for food. For information regarding the injury done corn I have had to depend almost entirely on what I could learn from the farmers, as very little corn is planted here this year. I could hear of but one field (8 acres); it was 5 miles from town and 2 miles from the lake. This I visited, but found the corn not yet up (May 21). A forkful of manure had been placed over each hill to keep the birds from finding it as soon as out of the ground. The farmers near Heron Lake say it is of no use to plant corn at all, as they can not keep the birds off. Mr. Thomas Miller, who lives near the lake, says he planted a piece of corn last year, and that by constant watching with a shot-gun, and planting over the hills that had been pulled up for the second time, he succeeded in raising about two-thirds of the hills planted; and then in the fall the birds destroyed a large part of that before it ripened. He says the birds do as much damage to the crops before harvest in the fall as they do in taking the seed in the spring.

The principal crops raised here are wheat, oats, and flax. These crops are now so far advanced that the birds can not injure them much more, but they are still constantly visiting the fields, and the stomachs preserved will show what their food is. All through the fields of flax, wheat, and oats are spaces bare of grain and coming up to weeds.

In the latter part of summer the Blackbirds are said to congregate in large flocks and devour and break down a great deal of wheat, oats, and barley just before it ripens. I can not learn positively what species are responsible for this damage; probably the Rusty Grackle is one.

I can not suggest any means of immediate relief, but believe that the extermination of the Blackbirds, especially the Yellow-headed, Red-winged, and Purple and Rusty Grackles, would be of great advantage to the farmers. But how is this to be done? I do not think by the shot-gun, for I have found it very difficult to get specimens for stomachs in that way. They are so shy that it is difficult to ap-

proach within shooting distance. The only way I could kill them was to get where they fly from the lake to the fields and shoot them as they passed. I am told that they will not eat grain soaked in strychnine or arsenic, but I think a series of experiments in poisoning them might be profitable. They seem easily baited, and perhaps could be caught in nets like pigeons.

The legislature of Minnesota has authorized the county commissioners to allow a bounty on Blackbirds and Gophers, but in this county no action has been taken in the matter, and the people do not seem to think it much use. Perhaps the birds could be killed when they have young by going among their nests.

Round Lake, Nobles County, Minn., May 12, 1887.—Abundant. A great many are just beginning to build nests.

Ortonville, Big Stone County, Minn., June 13, 1887.—Numerous; breeding in the reeds along the lake. Found 21 nests in going about 40 rods along the shore. They were all built in the reeds, and were from 1 to 5 feet high. Two nests had sets of four eggs; two of three; one of two; one of one; one three young and one egg; and two had shells of eggs. Twelve nests were empty, though all completed. Most of the empty nests were over dry ground. Only one nest on dry ground had eggs; it was 4½ feet high. Most of the nests over water contained eggs.

Brown's Valley, Traverse County, Minn., June 21 to July 8, 1887.—Numerous; a great many breed in the reeds at the south end of Lake Traverse. June 23, all the young were out of the nests, and many of the adults had gathered into loose flocks along with Purple Grackles, Red-wings, and Cowbirds, and were feeding on a field of Hungarian grass (*Setaria italica*) which has just been sown. This field contains about 80 acres, and I estimated that there were not less than 300 Blackbirds and 100 Mourning Doves on it at one time. The stomachs sent will show their food.

Graceville, Big Stone County, Minn., July 11, 1887.—There are two clear lakes here surrounded by timber, and in places by high grass, rushes, and reeds. There is a large slough with rushes and grass. Here I found large flocks of Blackbirds (seemingly composed of about equal numbers of Red-wings, Yellow-heads, and Purple Grackles). There was a flock of about 200 near the elevator when the train came in, and many small flocks and loose birds were picking grain in the streets. Having to wait seven hours for the train, I went among the sloughs and found the birds very numerous. Many young that could fly only a short distance were in the grass. Many of the adult Yellow-heads were in the midst of their moult, the new black feathers showing plainly among the old rusty ones. Their wings were generally ragged, and some were minus a tail. The moult was not noticeable among the Red-wings and Purple Grackles at a distance. Later in the afternoon I saw several large flocks in the wheat and oat fields. This is the first time I have seen them feeding on grain.

Flandreau, Moody County, Dak., May 25–31, 1887.—Saw one pair; they do not stay here.

Fort Sisseton, Marshall County, Dak., June 15–18, 1887.—Numerous about the sloughs.

Harwood, Cass County, Dak., July 12–15, 1887.—Common.

Devil's Lake, Ramsey County, Dak., August 6–19, 1887.—Numerous in large flocks with Red-wings, Cowbirds, and Purple Grackles, and feeding on wheat and oats. They seem to prefer ripe grain, and feed from the shocks. They are about in equal numbers with Red-wings.

Bottineau, Dak. (western edge of Turtle Mountain), August 22–30, 1887.—Scarce; have seen but 2 or 3 in flocks with other Blackbirds.

Fort Buford, Dak., September 1–20, 1887.—About 20 were in the flocks of other blackbirds at first, but none were seen after about September 10. They were feeding on grasshoppers and wild sunflower seeds.

Red-winged Blackbird (*Agelaius phœniceus.*)

Round Lake, Nobles County, Minn., May 12, 1887.—Numerous.

Heron Lake, Jackon County, Minn., May 14, 1887.—Numerous; breeding. Great complaints are made of their depredations. (See remarks under Yellow-headed Blackbird.)

Ortonville, Big Stone County, Minn., June 13, 1887.—Not numerous.

Brown's Valley, Traverse County, Minn., June 21–July 8, 1887.—Numerous.

Graceville, Big Stone County, Minn., July 11, 1887.—Numerous; feeding on grain. (See Yellow-headed Blackbird.)

Flandreau, Moody County, Dak., May 23–31, 1887.—Not numerous; a few breed along the banks of the river and in the bushes. Found one nest in a bush 4 feet high, and one in a bush 8 feet high.

Fort Sisseton, Marshall County, Dak., June 15–18, 1887.—Numerous.

Harwood, Cass County, Dak., July 12–15, 1887.—Common.

Pembina, Dak., July 21–August 2, 1887.—Have not seen more than 5 or 6 except at a slough where there was a flock of about 20

Devil's Lake, Ramsey County, Dak., August 6–19, 1887.—Numerous in large flocks (from 1,000 to less). As near as I can judge these flocks are composed of about 40 per cent. Red-wings, 40 per cent. Yellow-heads, 15 per cent. Cowbirds, and 5 per cent. Purple Grackles. Sometimes they separate into flocks composed mainly of one species, but are constantly changing and mixing. The grain-fields near a lake or grove suffer most, while those far from either are seldom visited. The birds begin to feed at sunrise, and remain in or near the field until about sundown, when large flocks pour into the reeds near the lake to roost. Besides what they eat, they shell and knock off much grain, and where it has become thoroughly ripe before being cut the ground is covered with grain.

Bottineau, Dak. (western edge of Turtle Mountain), August 22–30, 1887.—Numerous in large flocks, feeding mostly on fields of unripe oats. Roost in reeds and willows along the creek.

Fort Buford, Dak., September 1–20, 1887.—About 20 were seen in a flock of other Blackbirds early in September, but none were seen after the 10th. They were feeding on grasshoppers and sunflower seeds.

Purple Grackle (*Quiscalus quiscula*).

Heron Lake, Jackson County, Minn., May 13–22, 1887.—Scarce; found three or four pairs breeding in groves.

Ortonville, Big Stone County, Minn., June 13, 1887.—Common; breeds in the timber along the lake.

Brown's Valley, Traverse County, Minn., June 21–July 8, 1887.—Common. (See Yellow-headed Blackbird.)

Graceville, Big Stone County, Minn., July 11, 1887.—Numerous, (See Yellow-headed Blackbird.)

Flandreau, Moody County, Dak., May 25–31, 1887.—Common.

Harwood, Cass County, Dak., July 12, 1887.—Common.

Grand Forks, Dak., July 19, 1887.—Common.

Pembina, Dak., July 21–August 2, 1887.—A flock of 15 or 20 stay in town and feed around kitchen doors and in the streets; have not seen them out of town,

Devil's Lake, Ramsey County, Dak., August 6–19, 1887.—Common; not numerous.

Bottineau, Dak. (western edge of Turtle Mountain), August 22–30, 1887.—Common in large flocks feeding on grain and bur-oak acorns.

Brewer's Blackbird (*Scolecophagus cyanocephalus*).

Pembina, Dak., July 21–August 2, 1887.—Saw about 20.

Fort Buford, Dak., September 1–20, 1887.—Numerous; probably 500 stay around the settlement, feeding largely on grasshoppers. They also eat wild sunflower seed (*Helianthus*), and feed along roads, railroads, and around houses. They roost in the brush on the flats.

Tilyou's Ranch, Dawson County, Mont., September 23–October 7, 1887.—Common. Saw a flock of about 40 with a herd of sheep; half of the flock were on the backs of the sheep most of the time.

Cowbird (*Molothrus ater*).

Round Lake, Nobles County, Minn., May 12, 1887.—Common.

Heron Lake, Jackson County, Minn., May 13–22, 1887.—Numerous.

Ortonville, Big Stone County, Minn., June 13, 1887.—Numerous.

Brown's Valley, Traverse County, Minn., June 21–July 8, 1887.—Numerous.

Flandreau, Moody County, Dak., May 25–31, 1887.—Common.

Fort Sisseton, Marshall County, Dak., June 15–18, 1887.—Numerous.

Harwood, Cass County, Dak., July 12–15, 1887.—Common.

Pembina, Dak., July 21–August 2, 1887.—Common. Have not seen them in fields. A flock of about 20 go with a herd of cows.

Devil's Lake, Ramsey County, Dak., August 6–19, 1887.—Common; in flocks with other Blackbirds, feeding on grain. Generally a few accompany every herd of cattle.

Bottineau, Dak. (western edge of Turtle Mountain), August 22–30, 1887.—Common in flocks with Red-winged Blackbirds.

Fort Buford, Dak., September 1–20, 1887.—A few seen with the Blackbirds early in September; none seen as late at September 20.

Bobolink (*Dolichonyx oryzivorous*).

Grand Forks, Dak., July 19, 1887.—Found one flock of about 20 feeding in an oat-field. The males are changing color; some are half brown.

Pembina, Dak., July and August, 1887.—Common; breeds. Seen mostly in flocks feeding on grain.

Devil's Lake, Ramsey County, Dak., August 6–19, 1887.—Common in flocks of from 25 to a less number; nearly always found in a field of unripe oats. The old males are about half black and white, and half yellow. A few young have undeveloped tails.

Bottineau, Dak. (western edge of Turtle Mountain), August 22–30, 1887.—Common in small flocks, feeding on grain.

Flandreau, Moody County Dak., May 25–31, 1887.—Numerous.

Fort Sisseton, Marshall County, Dak., June 15–18, 1887.—Numerous.

Fort Buford, Dak., September, 1887.—One seen September 20.

Round Lake, Nobles County, Minn., May 12, 1887.—Common.

Heron Lake, Jackson County, Minn., May 13–22, 1887.—Numerous.

Ortonville, Big Stone County Minn., June 13, 1887.—Numerous.

Brown's Valley, Traverse County, Minn., June 21–July 8, 1887.—Tolerably common, but not numerous.

Franklin's Gull (*Larus franklini*).

Devil's Lake, Ramsey County, Dakota, August, 1887.—Numerous. Flocks of from 50 to 500 were seen every day flying over the prairie in the afternoon. They were seldom far from the lake before noon. They feed on grasshoppers, and generally choose a field or level piece of prairie and circle around in a loose flock, coming to within a few feet of the ground (just sweeping the grass tops), but I have not seen them light. August 11 I had a fine opportunity to watch a flock. They came from the lake at 3 p. m. At first a small flock arrived, but at 3.15 it had increased to 300 or 400 birds. The place was a large area of low grassy prairie where grasshoppers were very abundant. The Gulls circled round and round near the grass tops until 3.30 p. m., and then all at once rose and flew away to the lake or to some other feeding ground.

Flandreau, Moody County, May 25–31, 1887.—Saw 5 following the river.

Fort Sisseton, Marshall County, June 15–18, 1887.—Common.

Round Lake, Minn., May 12, 1887.—Common.

Heron Lake, Jackson County, Minn., May 13–22, 1887.—Common; found no nests.

Ortonville, Big Stone County, June 13, 1887.—Flocks are seen occasionally, but do not breed here.

Brown's Valley, Traverse County, June 21–July 8, 1887.—Sometimes numerous and then not seen again for days.

Graceville, Big Stone County, July 11, 1887.—Common on the lakes. I think they must breed at the north end of Lake Traverse, as I saw several when I entered the valley.

MAMMALS.

Panther; Mountain Lion (*Felis concolor*).

Montana.—Tilyou's Ranch, Dawson County, September and October, 1887: One is said to have killed a number of sheep lately about 20 miles from here.

Dakota.—Black Hills, November, 1887: Said to be common in the wildest part of the hills. One young was brought into town by a hunter who killed the mother and the other young. I saw it November 2, a few days after it was caught, and think it would have weighed about 8 pounds then. The hunter said that the old one had just killed a large buck Black-tail Deer.

CANADA LYNX (*Lynx canadensis*).

Minnesota.—Elk River, Sherburne County, November, 1887: Rather scarce.

WILDCAT (*Lynx rufus*).

Minnesota.—Elk River, Sherburne County, November, 1887: Quite common here, and said to be numerous in the heavy timber in northern Minnesota.

Dakota.—Turtle Mountain, August, 1887: Said to occur. Deadwood (in Black Hills), October, 1887; a few tracks seen in the snow.

Montana.—Tilyou's Ranch, Dawson County, September and October, 1887: Numerous in the brush, feeding principally on the little Gray Rabbits. A number of hides taken here seem much more red than any I have seen before.

COYOTE; PRAIRIE WOLF (*Canis latrans*).

Minnesota.—Elk River, Sherburne County, 1887: Common, and at times numerous; very troublesome to sheep-raisers. In the fall of 1882 we had 80 sheep running out in the woods, and the wolves killed 22 of them. They were evidently all Coyotes, as no others were seen and there were no other tracks. Only one or two were killed at a time. Sheep can only be kept here by housing at night and keeping in an open pasture during the day. Very few are kept in this vicinity on account of the wolves.

Dakota.—Flandreau, May, 1887: Said to be present. Bottineau (on western border of Turtle Mountain), August, 1887: Said to be numerous.

Montana.—Tilyou's Ranch, Dawson County, September, 1887: Common; hear them bark and howl nearly every morning.

TIMBER WOLF (*Canis occidentalis*).

Minnesota.—Elk River, Sherburne County, 1887: Common here twenty years ago, but not found now except in the heavy timber to the north.

Montana.—Tilyou's Ranch, Dawson County, September and October, 1887: A few are said to occur.

RED FOX (*Vulpes fulvous*).

Minnesota.—Elk River, Sherburne County, 1887: Common.

Dakota.—Fort Sisseton, June, 1887: Said to be common. Devil's Lake, Ramsey County, August, 1887: Common. Black Hills, October, 1887: A few tracks seen in the snow.

Montana.—Tilyou's Ranch, Dawson County, September and October, 1887: Said to be common.

BLACK BEAR (*Ursus americanus*).

Minnesota.—Elk River, Sherburne County, 1887: Formerly common here, as they still are in the timber 50 miles to the northeast, from which region they occasionally ramble through their old haunts in this vicinity. In the past five years there have been two or three special bear migrations in autumn, when they have become common here.

Dakota.—Devil's Lake, Ramsey County, August, 1887: Said to occur. Turtle Mountain, August, 1887: Said to be common. Fort Buford, September, 1887: Occurs, but not so plentifully as formerly. Black Hills, October and November, 1887: Said to be found throughout the hills, and of three kinds—Black, Brown, and Silvertip. Could learn nothing definite about them.

Montana.—Tilyou's Ranch, Dawson County, September and October, 1887: Said to occur, but scarce.

RACCOON (*Procyon lotor*).

Minnesota.—Elk River, Sherburne County, 1887: Common. 'Coons sometimes eat corn in the field, especially before it is ripe.

Dakota.—Harwood, Cass County, July, 1887: Said to be common. Devil's Lake, Ramsey County, August, 1887: Common.

WEASEL (*Putorius ermineus*).

Minnesota.—Elk River, Sherburne County, 1887: Common. In the fifteen years that I have been on a farm we have always kept a large flock of chickens, and only

two have been killed by Weasels, so far as I know. During the past three years weasels have been abundant—more so, I think, than ever before—and all kinds of mice, particularly field mice (*Arvicolæ*) have been unusually scarce.

Yellow-bellied Weasel (*Putorius longicauda*).

Dakota.—Fort Sisseton, Marshall County, June, 1887: Caught one. It had eaten a large Pocket Gopher all but the head (the gopher was in a trap) and when it came back it took the gopher's place. Pembina, July, 1887: Said to be common. Devil's Lake, Ramsey County, August, 1887: Seems common. Caught two in the holes of Pocket gophers (*T. talpoides*), and think these gophers form a large part of their prey. Their holes are so slightly filled with dirt that the weasel can dig in without trouble. Bottineau, on western edge of Turtle Mountain, August, 1887: Saw one running over the prairie about 9 o'clock in the morning; went into the hole of Richardson's Spermophile. Rapid City, on eastern edge of Black Hills, November, 1887: Have seen a few tracks along creeks, and think they are quite common. Caught one in a trap baited with a prairie dog, and set by creek bank. It is just changing from the brown coat to the white, and is a little more than half white. The change is wholly due to the moult. The brown hairs come out very easily; the white hairs are firm. Many of the brown hairs fell out while skinning the animal. There is no snow on the ground now (November 12), but there was from October 22 to October 28, and a little flurry November 8 that remained but a few hours. The weather is steadily clear, warm days, and freezing nights. The mercury changes from about 28° to 70° F. every twenty-four hours.

Mink (*Lutreola vison*).

Minnesota.—Elk River, Sherburne County, 1887: Rather common and much trapped for fur. In the fall of 1885 one of my neighbors had 13 full-grown chickens killed in two successive nights. I set traps in his barn and caught 2 large Minks that night. Heron Lake, Jackson County, May, 1887: Saw tracks. Ortonville, Big Stone County, June, 1887: Saw some tracks. Brown's Valley, Traverse County, June and July, 1887: Seem to be common.

Dakota.—Fort Sisseton, June, 1887: Present. Harwood, Cass County, July, 1887: Said to be numerous. Grand Forks, July, 1887: Said to occur. Pembina, July and August, 1887: Said to be common. Devil's Lake, Ramsey County, August, 1887: Common. Turtle Mountain, August, 1887: Said to be common. Black Hills, November, 1887: Said to occur.

Skunk (*Mephitis mephitica*).

Minnesota.—Elk River, Sherburne County, November, 1887: Abundant. I believe Skunks to be beneficial because they feed almost entirely on insects. Heron Lake, Jackson County, May, 1887: Saw one dead. Ortonville, Big Stone County, June, 1887: Seem to be common. Brown's Valley, Traverse County, June and July, 1887: Common.

Dakota.—Fort Sisseton, June, 1887: Common; young half grown. Pembina, July and August, 1887: Common. Flandreau, Moody County, May, 1887: Common. Devil's Lake, Ramsey County, August, 1887: Common. Turtle Mountain, August, 1887: Said to be common. Fort Buford, September, 1887: Common. Rapid City (eastern edge of Black Hills), November, 1887: Caught one in a trap baited with a Prairie Dog; have seen a few holes, but they seem rather scarce.

Montana.—Tilyou's Ranch, Dawson County, September and October, 1887: Common; feed on grasshoppers and bull-berries.

Badger (*Taxidea americana*).

Minnesota.—Elk River, Sherburne County, 1887: Tolerably common. Heron Lake, Jackson County, May, 1887: Found some holes.

Dakota.—Fort Sisseton, June, 1887: Their holes are everywhere. I believe Badgers have caused the scarcity of small mammals here, as the places where they have dug out Mice and Gopher holes are numerous. I counted forty-five places where one had dug into a Pocket Gopher's hole, and in another locality fifty-eight places. They dig a small hole down until they strike the Gopher's tunnel, and continue the same process at frequent intervals until the tunnel is all cut up. Harwood, Cass County, July, 1887: Said to be common; saw a few holes. Grand Forks, July,

1887: Said to occur. Pembina, July and August, 1887: Common. Devil's Lake, Ramsey County, August, 1887: Common; saw tracks and holes. Bottineau (western border of Turtle Mountain), August, 1887: Said to be common. Rugby Junction, August 31, 1887: Found where a Badger had dug out a Richardson's Spermophile and eaten all but part of its tail. Fort Buford, September, 1887: Said to be common; I saw some tracks.

Montana.—Tilyou's Ranch, Dawson County, September and October, 1887: Common.

Otter (*Lutra canadensis*).

Minnesota.—Elk River, Sherburne County, 1887: Tolerably common. Heron Lake, Jackson County, May, 1887: Saw where some lived.

Dakota.—Devil's Lake, Ramsey County, August, 1887: Saw tracks of old and young. Turtle Mountain, August, 1887: Said to be common.

Montana.—Tilyou's Ranch, Dawson County, September and October, 1887: Present along the Yellowstone River.

Moose (*Alce americanus*).

Minnesota.—Saint Vincent: I am told by an honest and intelligent hunter that some Moose were killed last fall (1886), 15 miles east of Saint Vincent, Minn.

Dakota.—Bottineau: There are said to be some in the Turtle Mountains.

Elk; Wapiti (*Cervus canadensis*).

Minnesota.—Elk River, Sherburne County, 1887: Exterminated; a few old horns and bones remain. They are still found in the woods to the north. Saint Vincent: I am told by an intelligent and honest hunter that some Elk were killed last fall (1886), 15 miles east of Saint Vincent.

Dakota.—Larimore, Grand Forks County, July, 1887: I think I have good authority (in an old hunter) for the statement that two Elk were killed here five years ago. Devil's Lake, Ramsey County, August, 1887: A few said to occur. Bottineau (on western edge of Turtle Mountain), August, 1887: I have found some old Elk bones. Black Hills, November, 1887: Formerly common; a few said to occur still.

Montana.—Tilyou's Ranch, Dawson County, September and October, 1887: Not common; have seen a few tracks, and a few are killed every year.

Black-tailed Deer (*Cariacus macrotis*).

Minnesota.—Saint Vincent: I am told by an honest and intelligent hunter that three were killed last fall (1886), 15 miles east of Saint Vincent.

Dakota.—Pembina, July, 1887: Said to be found 34 miles west of here in the Pembina Mountains. Fort Sisseton: Said to have been present formerly in about equal numbers with the Virginia Deer, but both disappeared about three or four years ago. Devil's Lake, Ramsey County, August, 1887: Said to be a few here, but mostly killed off. Turtle Mountain, August, 1887: I am told that there are a few in the hills, and that they are common on the Mouse River, farther west. Fort Buford, September, 1887: Said to be common among the hills, but I do not consi er the authority worth much. Black Hills, October, 1887: The Black-tail is common through the hills, but the White-tail seems to be absent.

Montana.—Tilyou's Ranch, Dawson County, September and October, 1887: Common in the hills and open country; said to be much more easily killed than the Virginia Deer, so consequently are becoming scarce. Said to be common at various places along the stage road from Miles City, Mont., to Deadwood, Dak.

White-tailed Deer; Virginia Deer (*Cariacus virginianus*).

Minnesota.—Elk River, Sherburne County, November 28, 1887: Now scarce; formerly numerous.

Dakota.—Fort Buford, September, 1887: Said to be common in the brush along the river, but I do not consider the authority worth much. Black Hills, October, 1887: I can find no one who has ever seen this Deer here.

Montana.—Tilyou's Ranch, Dawson County, September and October, 1887: Numerous in the brush along the river.

ANTELOPE (*Antilocapra americana*).

Dakota.—Fort Sisseton: Formerly common here; the last were seen five years ago. Larimore, Grand Forks County: I think I have good authority (an old hunter) for the statement that an antelope was killed at Larimore, Grand Forks County, Dak., two years ago (in 1885). Pembina: Said to be found 34 miles west of here, in the Pembina Mountains. Devil's Lake (northeastern Dakota): A drove of 14 said to have spent last winter (1886–'87) near here. Bottineau (on western edge of Turtle Mountain): Said to be common on the Mouse River, west of here.

Montana.—Tilyou's Ranch, September 23 to October 6, 1887: Common back in the hills and bad-lands. Stage road from Miles City, Custer County, Mont., to Deadwood, Lawrence County, Dak.: Between Boxelder and Willow Creeks I saw a drove of 85, one of 20, and one of 12 (117 in all) in October, 1887.

ROCKY MOUNTAIN SHEEP (*Ovis canadensis*).

Montana.—Tilyou's Ranch, Dawson County, September and October, 1887: Said to be a few in the bad-lands.

Dakota.—Black Hills, November, 1887: Seldom seen; formerly common.

STAR-NOSED MOLE (*Condylura cristata*).

Minnesota.—Elk River, Sherburne County, 1887: Scarce; have not found more than 3 or 4 in fifteen years' residence here.

MOLE (*Scalops aquaticus*).

Minnesota.—Elk River, Sherburne County, November, 1887: I have the skin of the only one I have ever seen here.

SHORT-TAILED SHREW (*Blarina brevicauda*).

Minnesota.—Elk River, Sherburne County, 1887: Common; they often get into cellars and prove troublesome. Ortonville, June, 1887: Numerous all along the little spring brooks; caught one on the high prairie; baited them with cheese, which they took readily.

Dakota.—Harwood, Cass County, July, 1887: Caught one. Pembina, July, 1887: Found one dead.

WATER SHREW (*Neosorex palustris*).

Minnesota.—Elk River, Sherburne County, November 28, 1887: Rather scarce; have always found them living in holes in creek banks; in the spring of 1886 a neighbor caught and gave me one that he found swimming in a small pond of snow water in a hollow near his house.

BLACK-BACKED SHREW (*Sorex* [*forsteri ?*]).

Minnesota.—Elk River, Sherburne County, November, 1887. Quite common, but not so numerous as *S. personatus*. Both species are found in the same localities, and their habits are much the same.

SMALL SHREW (*Sorex* [*personatus ?*]).

Minnesota.—Elk River, Sherburne County, 1887: Abundant; live under logs, leaves, and grass, either in woods, meadows, creek banks, or any wild land. They are always a great pest to settlers who first build in the woods, as they enter barns, houses, and especially cellars, gnawing whatever they can find in the shape of meat, lard, tallow, butter, or anything of the kind. I learned this by experience some fifteen years ago, and have heard the same complaint from others. Cats kill them, but I think generally leave them where killed, for they are often found lying around dead. Brown's Valley, Traverse County, June, 1887: Caught one on the river bank.

Dakota.—Grand Forks, July, 1887: One specimen secured. Devil's Lake, Ramsey County, August, 1887: One found dead in the road. Bottineau (western border

of Turtle Mountain), August, 1887: Caught one under some brush near a creek bank. Black Hills, October, 1887: Saw a few tracks in the snow, and caught 2 at holes in the rocks on top of one of the highest peaks.

Hoary Bat (*Atalapha cinerea*).

Minnesota.—Elk River, 1887: Scarce; I have found but 3 in the last ten years. Ortonville, June, 1887: One evening I saw 8 Hoary Bats rise from the trees and fly up and off towards the prairies. Shot at several, but they were too high. They all rose soon after leaving the trees, and some went almost straight up until out of sight. The exact locality was a small wooded peninsula extending into the lake. Brown's Valley, Traverse County, July 6, 1877: Saw 2 fly from the trees along the Minnesota River.

Dakota.—Pembina, August 3, 1887: Saw one. Devil's Lake, Ramsey County, August 6, 1887: Saw a few.

Red Bat (*Atalapha noveboracensis*).

Dakota.—Devil's Lake, Ramsey County, August, 1887: Common; caught 5 in low trees, and saw others every evening in the woods. Those that I caught were hanging in thick box-elder leaves, from 4 to 15 fe t from the ground. The first was in a bush not as high as my head, and I killed it with a stick; the others were higher up.

Silver-haired Bat (*Vesperugo noctivagans*).

Minnesota.—Elk River, Sherburne County, 1887: Rather more common than the Hoary Bat, but still scarce; roosts under bark on old trees.

Dakota.—Bottineau (on western border of Turtle Mountain): Caught 2 under bark on old trees.

Small Brown Bat (*Vespertilio [subulatus?]*).

Minnesota.—Elk River, Sherburne County, November, 1887: Abundant during warm weather.

Flying Squirrel (*Sciuropterus volucella*).

Minnesota.—Elk River, Sherburne County, November, 1887: Abundant.

Minnesota Gray Squirrel (*Sciurus carolinensis hypophœus*).

Minnesota.—Elk River, Sherburne County, November, 1887: At present numerous; six months ago scarce. Acorns are an abundant crop this year, and the Squirrels have increased greatly; probably to some extent by immigration, as they are said to have been often seen during the summer on the prairies and crossing fields. They were never so numerous here as at present.

Red Squirrel (*Sciurus hudsonius*).

Minnesota.—Elk River, Sherburne County, November, 1887: An abundant resident. Ortonville, Big Stone County, June, 1887: Found none; said to occur, though not common.

Dakota.—Harwood, Cass County, July, 1887: Said to occur here. Grand Forks, July, 1887: Numerous in the woods. Pembina, July and August, 1887: Common in the woods. Bottineau (on western border of Turtle Mountain), August, 1887: Very common wherever there is brush. Black Hills, October and November, 1887: Common all through the pine timber on the hills; they live mostly in holes in the rocks, much the same as *Neotoma;* their principal food seems to be the seeds of pines, the cones of which they store in clefts in rocks and in all manner of sheltered places. I found a hollow pine with 2 or 3 bushels of cones inside of it, and a Red Squirrel in a nest in the middle of them.

Eastern Chipmunk (*Tamias striatus lysteri*).

Minnesota.—Elk River, Sherburne County, 1887: Abundant; they sometimes dig up corn when planted near brush or woods. Ortonville, Big Stone County, June,

1887: Common everywhere in the timber. Brown's Valley, Traverse County, June and July, 1887: Numerous in suitable places on both sides of the valley. The timber in the ravines and along the streams is mostly iron-wood, bass-wood, ash, and box-elder, the seeds of which furnish them an abundance of food; have found but few adults, most of them being about three-fourths grown. Fort Sisseton, June, 1887: Numerous. Harwood, Cass County, July, 1887: Numerous in the woods. Grand Forks, July, 1887: Numerous in the woods. Pembina, July, 1887: Common in the woods. Bottineau (on western border of Turtle Mountain), August, 1887: Quite common, but not so abundant as *T. quadrivittatus*.

Rocky Mountain Chipmunk (*Tamias quadrivittatus*).

Dakota.—Bottineau (on western border of Turtle Mountain), August, 1887: Common in the brush on top of the Turtle Mountains. Heard one in the brush along the creek where it runs through the prairie. They seem to prefer brush to woods, and generally are found in a thick bunch of willows or hazel brush, and not more than 5 feet from the ground. Have not seen one in a tree. They feed principally on the seeds of choke-cherries, the meats of which is the only food I have found in their pouches. Their call note is a steady churp, churp, churp, like the cry of a Robin when in fear for its young, but with just the slightest husky tone. At first I was sure it was a Robin, but on finding out what it was, could detect a slight difference. The cry is repeated steadily, and about as fast as the chuck, chuck, chuck of *Tamias striatus lysteri*, but not so heavy. When they see or hear you, or become alarmed, the cry changes to a rapid quit, quit, quit, like a Ruffed Grouse when about to fly, but finer and faster. When suddenly frightened they run with a rapid twitter. They are much livelier than *Tamias striatus*, keeping in almost constant motion, especially their long tails, which are switching, jerking, and flirting almost incessantly. When frightened they always run to the ground, but show a good deal of curiosity, and will often be back in the bush in half a minute if you keep quiet. Black Hills, October and November, 1887: Numerous on the hills; more common high up than low down. They live among rocks or brush heaps, and feed largely on rose seeds, a kind of wild rye, snow-berry seeds, and the seeds of a small aster; they also eat grass seeds and seeds of choke-cherries. Fort Buford, September, 1887: Said to occur.

Montana.—Tilyou's Ranch, Dawson County, September and October, 1887: Said to be common, but I have seen only one. Glendive, 1887: Abundant high up on the hills.

Striped Gopher (*Spermophilus tridecemlineatus*).

Minnesota.—Elk River, Sherburne County, 1887: Common on the prairies and openings; in some places numerous. Not found in timber land. They do much damage to crops, principally by digging up seed. They damage corn more than any other crop, sometimes digging up half of the seed in a field, both before and after it comes up. I do not know that they do any serious damage to crops except by taking the seed. Round Lake, Nobles County, May, 1887: Numerous. Heron Lake, Jackson County, May, 1887: Numerous all over the prairies, and especially along the edges of fields, where they dig up the grain. I do not think they do very serious damage, and I know by experience that they are easily caught. Complaints are made of the damage done by them. Ortonville, Big Stone County, June, 1887: Numerous all over the prairie, and only on the prairie. I think one to every acre of ground a small estimate of their numbers. As far as I have observed, they feed on grain, seeds, sorrel roots, strawberries, green leaves, grasshoppers, and other insects. The stomachs examined contained strawberries, red ants, grasshoppers, some other insects, and some green stuff. Caught the smallest adult of the species I have ever seen (total length 268^{mm}, tail 94 and very slender). It is a female, and was nursing. The color is rather lighter than usual. Brown's Valley, Traverse County, June and July, 1887: Numerous all over the prairie; seldom seen on the low ground. Saw the first young July 6; they were about half-grown. This Gopher feeds extensively on the seeds of *Stipa spartea*, which is abundant everywhere on the prairie. In skinning one of them I found a seed of *Stipa spartea* fast in the cheek pouch. The awn was broken off and the seed had turned crosswise, so that the sharp point had penetrated the pouch, which was inflamed and swollen. They eat the tender juicy roots of *Wild Larkspur*, and seem to have dug and eaten it all now. I searched half an hour before finding a specimen, though the top of plants that had been dug and eaten were all around. I have found seeds of knot-grass and puccoon in their pouches. The stomach sent will show many insects and some fruit. June 27 I first noticed that they were cutting wheat that was just heading

out. Each head was cut off at one bite, about five inches from the ground, and remained untouched. Two days later (June 29) I came by the same field and saw that they were still cutting the wheat, and the ground was strewn with the heads. Probably 15 per cent. of the heads had been cut on a strip about 20 feet wide, along the edge of the field, and from a few of the heads the ovules had been eaten. The wheat was just beginning to blossom then. At this time the ovules are about the size of onion seed and slightly milky. The Gophers cut the heads off, examine them, and then try to find a better one, thus eating only a small part of what they destroy. Since very many more of the small watery ovules are required for a feed than in the case of ripe grain it would seem that this is the most destructive period of their ravages. Graceville, Big Stone County, July, 1887: Common; cutting grain. At the edge of a wheat field where one of these Gophers lived the wheat was cut on a semi-circular area about 25 by 45 feet. Selecting a place that seemed a fair average I measured a square yard, on which I counted 31 heads that had been cut down, and 100 that were standing. But few of those cut were eaten, the kernels being about half-grown and watery. Oats and barley were destroyed in the same way.

Dakota.—Flandreau, Moody County, May, 1887: Numerous. Fort Sisseton, Marshall County, June, 1887: Common. Harwood, Cass County, July, 1887: Common; feeds mostly on grain and grasshoppers. Grand Forks, July, 1887: Numerous; working in the grain as at all other places. Pembina, July and August, 1887: Common on open ground and in the fields. Both this species and the Gray Gopher (*S. franklini*) are abundant and of nearly equal numbers, this species probably predominating. On the open prairie they feed largely on grasshoppers, but are more common along the edge of grain-fields, where both species feed almost entirely on grain. I can not see that they show any preference between wheat, oats, and barley. The quantity of grain they destroy is considerable, but evidently less at present than earlier in the season, as it is now full grown and in the dough. Probably they take less now than they will when it becomes ripe enough to store up for future use. Devil's Lake, Ramsey County, August, 1887: Common. Of the three species of *Spermophilus* encountered on this trip the Striped is most numerous, the Gray (*S. franklini*) but little less so, and Richardson's (*S. richardsoni*) seems common. Each species seems to have its special range, indicated by the character of the ground. This species keeps on open ground (prairies, marshes, and fields). *S. franklini* seems to prefer woods, brush, or low, marshy, and weedy places. *S. richardsoni* is the only species I have found on high prairie; generally it was near the edge of a grain-field. The Striped Gopher covers more ground and is more numerous throughout its range than the others. All of the three species are now most numerous at the edges of grain-fields, from which they are carrying grain to store for winter use. But the loss which they cause to the farmers is nearly past, for the greater part of the grain is cut and in the shock and enough is left on the ground to last the Gophers until seed time, and it is easier for them to gather than that in the shock. Bottineau (on western edge of Turtle Mountain), August, 1887: Common on prairies and in fields. Fort Buford, September, 1887: Common, but seldom seen at this season. They are now very fat. At present they live almost entirely on sunflower seeds, though probably also eating cactus seed and seeds of weeds. They are throwing out large piles of dirt from their holes. Have not seen one running about since coming here, though they are common enough, and I had no difficulty in catching them in traps. Have noticed the same thing at Elk River, Minn., where they were seldom seen after September 1. After this they keep very quiet and out of sight as much as possible, never standing upright or making a sound. Have noticed that these animals decay sooner than usual when feeding largely on grasshoppers.

Montana.—Tilyou's Ranch, Dawson County, September and October, 1887: Common; are small and pale. Feed principally on seeds of wild sunflower (*Helianthus*) and grasshoppers, also seeds of the cactus (*Opuntia*). They are very fat.

Gray Gopher. (*Spermophilus franklini*).

Minnesota.—Elk River, Sherburne County, November, 1887: Rather scarce. Heron Lake, Jackson County, May, 1887: Found this Gopher here, but not in sufficient numbers to do much harm. Ortonville, Big Stone County, June, 1887: Abundant. A few are scattered over the prairie, but in the timber near the lake, and in the ravines, there are a great many. Of 15 killed, 10 were males and 5 females, but the females have young now and may keep out of sight. The males are quite fat. Their principal food seems to be bass-wood seeds, which are very plentiful. They also eat some green plants and leaves. Shot one while eating a Wood Phœbe that it had just killed. On the prairies they are mostly found near grain-fields or in marshy places. Along the edge of a field of barley where several lived I found where they had been digging little holes, and on examining them

found that at each place they had dug up from three to a dozen kernels of barley that had been buried 1 or 2 inches under ground. Most of it had just sprouted, but that in the field was up 5 or 6 inches high, and there was no meat in the hull. Their cry is a rattling chipper on a high key, much like that of the Striped Gopher (*S. tridecemlineatus*), and I have sometimes been unable to tell them apart. Usually they run low, and go scudding through the grass, but if badly frightened take long, high leaps, exactly like a Gray Squirrel. They seem to like to make their burrows near or under old buildings that are not inhabited, and often live under barns that are in use. Brown's Valley, Traverse County, June and July, 1887: Occasionally found on the prairie, and very numerous all over the valley, even in town. Their food on the prairie seems to consist largely of seeds of *Stipa spartea* and cockle-bur. Wherever the cockle-bur grows the ground is covered with shells of the burs that have had the seeds eaten out. Many of the Gray Gophers live among piles of manure which have been hauled out of town and dumped on the common. They dig in the manure and probably find grain. I have been told that one killed 5 chickens that were feathered out and probably as large as quail. The woman who told me saw the Gopher kill one of them. I have seen one within 15 feet of an open door, and it did not seem at all afraid. Many live under houses. I saw the first young one out of the hole June 30, and some more July 6. They were about half grown.

Dakota.—Pembina, July and August, 1887: Common in brush, prairie meadows, and fields. Caught one on the prairie and found in its stomach much wheat, some grasshoppers, and the remains of several young mice (*Hesperomys michiganensis*). Fort Sisseton, June, 1887: Common. Harwood, Cass County, July 1887: Common; not numerous. Grand Forks, July, 1887: Scarce. They bend the grain over, instead of biting it off like the Striped Gopher. Flandreau, Moody County, May, 1887: Scarce. Devil's Lake, Ramsey County, August, 1887: Common; seems to prefer woods or low marshy and weedy land. Bottineau (on western border of Turtle Mountain), August, 1887: Evidently scarce; saw none alive, but found one that a hawk had partly eaten.

Richardson's Gopher (*Spermophilus richardsoni*).

Dakota.—Devil's Lake, Ramsey County, August, 1887: Tolerably common. Found on the high prairie, generally along the edge of grain-fields. Killed one as it ran from under a shock of oats. Its pouches were stuffed full of oats, 269 kernels in all. Bottineau, August, 1887: More numerous than any other Gopher, averaging about 1 Gopher to every 2 acres of prairie. They feed on grain in the fields, and largely on seeds of pigweed (*Chenopodium album* and *boscianum*), both kinds of which are abundant. They do not seem to be collected around fields more than on the open prairie. Have never found them in the brush or on low or weedy ground. From sunrise to 9 o'clock in the morning they may be seen running or sitting up all over the prairie, even in the edge of town. After 9 a. m. they retire to their burrows and are seldom seen. They are the least suspicious and have the most curiosity of any of the Spermophiles known to me. When they run, their tails flap up and down like a Woodchuck's, and when sitting up they shake their tails every few seconds. Their holes are large, with a pile of earth like a Pocket Gopher's hill at the entrance. Of 13 specimens killed here, but 1 was a female. Much of their excrement is scattered about near and in the entrance of most of their burrows, which is something I have never seen near the holes of other Spermophiles. Rugby Junction, 1887: Numerous.

Prairie Dog (*Cynomys ludovicianus*).

Montana.—Tilyou's Ranch, Dawson County, September and October, 1887: Eight miles from here there is a colony of about 6, and 5 miles down the river there is another colony of 100 or less. They feed on grass and many kinds of weeds. I visited a Prairie Dog colony on the east side of the Yellowstone River, 21 miles from Fort Buford. The colony occupies a level prairie about 1 square mile in extent, and just above flood level. There are probably 2,000 holes, and not 100 dogs. But few of the holes are used, and some are closed up. I think they do not live in a hole longer than one year. In most cases the dirt is thrown out of the holes all around, instead of in a pile on one side. It then forms a cone like a volcano around the opening, the rim varying in height from 10 inches to less. The quantity of dirt thrown out varies much; at some places I estimated that there was 2 cubic yards of it; at other holes there was none. The earth is very hard at the edges of some holes, evidently having been packed while wet, and forms a sharp ring around the

hole. The holes run down at an angle never far from 45°, and seem to go straight on at that pitch for about 8 or 10 feet at least. A piece of dirt will roll down them and can be heard rattling a long way down. The holes are usually smaller at the opening than farther down; the entrances are slightly flattened, so that the two diameters are not alike. Following are measurements in inches of the longest and shortest diameters of several burrows, taken near the opening: 4 by 5, 4 by 5, 4 by 3½, 4 by 3½. Many holes have been dug larger by Skunks or Badgers. I have been told that Prairie Dogs never leave any excrement near the holes, but I find it scattered all around, and most numerous near the holes, some even down in the holes. The animals are very shy. When they see you they run to the nearest hole, and then sit up like a Gopher and watch until you approach within 40 rods; then they dodge down the hole, or sometimes crawl part of the way in and continue to watch until you are quite close, but if shot then and killed ever so dead they will slide down beyond all reach. I tried to dig them out, but after digging down 3 or 4 feet in the hard clay could see away down the hole, and gave it up. It still took more than a bushel of loose dirt to fill the hole below, so that dirt would not slide down. When they are sitting up at a distance watching you they keep up a chippering that is almost exactly like the barking of a very small dog, but is faster. While barking they keep their tails flapping up and down very fast, and also when running and when they start down a hole. The motion is the same as that of Richardson's Gopher (*S. richardsoni*), which they resemble much in all their actions. They feed mostly on a short, fine grass (buffalo grass) that grows all over the prairie. They dig it up and seem to eat the bottom part, for the ground is covered in places with the leaves and roots. In the excrement I find traces of nearly every plant which grows near, especially of *Artemisia frigida*, knot-grass, and a small aster that is full of seeds. They are very fat. I cooked one and ate part of it. It was not cooked very tender, but was perfectly sweet and free from any strong taste: was much like the flesh of a mallard duck. There is not the least unpleasant smell about them. There was a dead horse in the dog-town, which I was told broke its leg by stepping into a Prairie Dog hole when running. I am told that a man about 40 miles from here has a machine for forcing sulphur smoke down the holes, and that he kills many by smoking them out. Glendive, October, 1887: On a prairie about 2 miles north of town there are a few Prairie Dogs. I have killed 6, and there are probably as many remaining. There are many unused holes extending over about 1 square mile of land (perhaps 1,000 holes), and the dogs are said to have been numerous there last summer, but from some cause have disappeared. The people here think that the cold winter killed them off. Some persons say that a crust of ice covered the ground for a long time, and the dogs starved because they could not get to the ground for food. Last year was unusually dry, and vegetation, always scant here, was nearly all dried up. Then followed a very cold, stormy winter. Nearly all the cattle and sheep died, and probably the Prairie Dogs were likewise affected by the weather. In this colony there are four places, far apart, where from 2 to 4 dogs live together, each group occupying 3 or 4 holes, but having 1 hole which seems to be home, and into which they generally run when frightened. When they run into their holes I have not known them to come out within an hour, and sometimes they do not come out again for half a day. Their food seems to consist principally of the roots and the lower part of the stalk of the fine, short prairie grass, but nearly all of the surrounding plants are eaten more or less. Do they hibernate? The people here say they do not, but come out to feed on every warm day all winter. Along the stage road from Miles City to the Little Missouri dog-towns were frequently seen, but few of the holes seem to be occupied.

Dakota.—Fort Buford: Not present in this immediate vicinity, but there is said to be a large town about 60 miles northwest from here, on the Milk River. Rapid City, November, 1887: One of the earliest settlers here, a Mr. Chase, says that when he came to this place, in 1877, Prairie Dogs were numerous where the town of Rapid City now is, as well as over most of the surrounding prairie. Little flat mounds, indicating where the holes were, still remain, but most of the Prairie Dogs have disappeared. About 2 miles east of town there is a colony of about 100, occupying probably 40 acres of land. I should think there were 200 holes, and every one seems to be used. It is on a level prairie near, and about 12 feet above, Rapid Creek. This prairie is fenced in at present and used for a horse pasture, though part of the ground has been plowed and a crop of millet was raised on it this year. About one-fourth of the Prairie Dog holes are in the field of millet stubble. The ground that has not been plowed is covered with short, fine grass, but near the holes this grass has been dug up and eaten until killed out over a space 2 rods wide or less, around most of the holes. This space, where there is no grass, has grown up thick with knot-grass, which they do not seem to dig up. I think the stomachs sent will show that knot-grass seed now forms a large part of their food. Probably to it they owe much of their fat.

It takes little imagination to make this seem like farming, for the Prairie Dogs keep digging up the grass around the outside of their little farms all summer, and so enlarging their field of grain for fall and winter use.

The knot-grass grows all along roads and old fields. Probably it is *Polygonum aviculare* or a variety.

Several Prairie Dogs often run into the same hole. I have counted as many as six going into one hole. The last one generally stays out and barks until approached almost within shooting distance, and sometimes until close enough for a shot. I approached one by walking slowly and whistling until within about 20 feet, and then shot it dead, but could never charm another.

If they see a person 40 rods away they all run and get into or very near their holes and bark; as you come nearer they get lower down in the holes, until almost out of sight, but keep barking and shaking their tails until they think the danger is too near, then, with a parting shake of the tail, down they go, and they are not likely to appear again for several hours. By creeping very low I have got near enough to shoot some through the head with large shot, and if killed very dead, and I could get hold of it before it slid or kicked down the hole too far, it was my dog; if not, it was lost.

They seem to pay no attention to horses feeding among their holes, but run all around them. I have found two stone arrowheads among the holes, and so conclude that the Indians liked Prairie Dogs.

When they see anything suspicious at a distance they get on the highest mounds, and, stretching as tall as possible, watch it. Now and then one will come up to the perpendicular with a kind of jump, evidently to try and get a little higher, and at the same time utter a peculiar cry, a kind of long "chur-r-r-r-r." This is the only sound I have ever heard them make beside barking. If a Red Squirrel was as large as a Prairie Dog its bark would not be very different—that is, when a Red Squirrel barks the fastest and most excitedly.

They do not throw the dirt out of their holes in one pile in front of the hole, as Woodchucks and most animals do, but it is built up in a ring around the hole, forming a cone with sometimes quite sharp edges. The cone varies according to the amount of dirt thrown out, and is generally 10 or 12 inches high. It is sometimes a steep rim, and is sometimes wide and flat. The mouth of the holes are nearly always "bell muzzled," or flaring from the bottom to the top of the cone, and in most of the holes you can plainly see where the dogs have shaped it, while the earth was soft and muddy, by pressing it back with their noses, leaving the little round prints of their noses in the hard clay close together, and perhaps a hundred or more in the sides of one doorway. Eyes dark brown (the iris). The animals are now very fat, but show no signs of hibernating.

Woodchuck; Ground Hog; Marmot (*Arctomys monax*).

Minnesota and eastern Dakota.—Occurs in the Red River Valley from Pembina southward, but is rare. In Sherburne County, in eastern Minnesota, it is rather common.

Yellow-bellied Woodchuck (*Arctomys flaviventer*).

Dakota.—Occurs in the Black Hills, but was not known from the region about Fort Buford.

Beaver (*Castor canadensis*).

Dakota.—Fort Buford, September, 1887: Said to be found along the Missouri River. Black Hills, October and November, 1887: Formerly common here; a few said to be still found in places far back from the settlements.

Montana.—Tilyou's Ranch, Dawson County, September, 1887: Quite common along the river; have seen some tracks.

House Rat; Norway Rat (*Mus decumanus*).

Minnesota.—Brown's Valley, Traverse County, June and July, 1887: Abundant.

Dakota.—Grand Forks, July, 1887: Said to have been found here only recently. Pembina, July and August, 1887: Does not occur. Devil's Lake, Ramsey County, August, 1887: Does not occur. Fort Buford, September, 1887: Common; caught a very large one in my room, and heard them every night.

House Mouse (*Mus musculus*).

Minnesota.—Elk River, Sherburne County: The House Mouse is common about our buildings. Ten years ago, when the place was new and surrounded by timber,

the White-footed Mouse was the common house Mouse (1886). Brown's Valley, Traverse County, June and July, 1887: Abundant.

Dakota.—Fort Sisseton, June, 1887: Common. Grand Forks, July, 1887: Common. Pembina, July and August, 1887: Common. Devil's Lake, Ramsey County, August, 1887: Common.

Wood Rat; Brush Rat (*Neotoma cinerea*).

Dakota.—Black Hills, October and November, 1887: Common among the rocks high up. They live in caves, cracks, and holes under the rocks. Their principal food seems to be the seeds from the pine cones. Large piles of gnawed cones are scattered around their holes.

White-footed Mouse (*Hesperomys leucopus*).

Minnesota.—Elk River, Sherburne County, 1887: Numerous everywhere.

Western White-footed Mouse (*Hesperomys leucopus sonoriensis*).

Minnesota.—Brown's Valley, Traverse County, June 21 to July 8, 1887: Most numerous on the east side of Lake Traverse.

Dakota.—Pembina, July 21 to August 2, 1887: Common, and with one exception found only in the woods. Devil's Lake, Ramsey County, August 6 to 19, 1887: Common in woods and brush. Bottineau (on western edge of Turtle Mountain), August 22 to 30, 1887: Numerous in the brush. Fort Buford, September 1 to 20, 1887: Abundant in all brush, and common on prairie and hills. Evidently feeds extensively on the seed of cactus (*Opuntia missouriensis*) and the seed of wild sunflower (*Helianthus rigidus*). Deadwood, in Black Hills, October 24 to 31, 1887: Common on the tops of the highest hills. Fort Sisseton, Marshall County, June 15 to 18, 1887: Apparently scarce: probably because of the abundance of Badgers. Rapid City (on eastern edge of Black Hills), November 16, 1887: Quite common among the rocks on the hills and around fields on the prairie. The color of the adults is paler than any seen before.

Montana.—Tilyou's Ranch, Dawson County, September 23 to October 6, 1887: Common in brush and on hills.

Michigan Mouse (*Hesperomys michiganensis*).

Minnesota.—Brown's Valley, Traverse County, June 21 to July 8, 1887: Common on the high prairie in the town of Traverse, on the Dakota side of the valley. Found them in the same holes with the Grasshopper Mouse (*Onychomys leucogaster*) in the Indian mounds.

Dakota.—Harwood, Cass County, July 14, 1887: Numerous all through the fields and meadows; cuts down much wheat and other grain. Flandreau, Moody County, May 25 to 31, 1887: Found on ground a little higher than that inhabited by the Meadow Mice (*Arvicola riparius*). Caught one on top of a high hill. Pembina, July 21 to August 2, 1887: This *Hesperomys*, which is common on the prairies here, seems to be about the only Mouse of economic importance. It lives near the grain fields, and cuts down a small quantity near the edges. It cuts some grasses on dry ground for the seed, but is not numerous enough to be of great importance. I think it eats the seed of pennycress (*Thlaspi arvense*) which has become so thick that in some fields nothing else can grow. Some fields are abandoned to it, and it is more or less in all of them. While this species inhabits the prairies and open ground, the White-footed Mouse lives in the woods. Bottineau (on western edge of Turtle Mountain), August 22 to 30, 1887: Caught one under a wheat shock on the prairie that I believe is this species. It is very different from from the *H. leucopus* found here in the brush, the principal difference being in the darker gray color, slenderer build, and much slenderer tail.

Grasshopper Mouse (*Onychomys leucogaster*).

Minnesota.—Brown's Valley, Traverse County, June and July, 1887: Numerous on the flats near town and common on the high prairies west of the valley; not found on the east side. They live in holes on the top of Indian mounds, in sides of banks, and in holes under débris among brush. They seem fond of cheese and fried cakes, but of their other food I learned only by dissection. They begin moving

early in the evening, and I shot one while running through the weeds about 8 o'clock in the morning.

Dakota.—Devil's Lake, Ramsey County, August, 1887: Found one dead on a road. Bottineau (on western edge of Turtle Mountain), August, 1887: Did not secure it, but a farmer described it accurately and said he had found a few. Fort Buford, September, 1887: Common on the hills and prairies; not found in the brush; easily caught in any kind of trap baited with cheese or cake. They live in holes which they dig or steal; I think they generally occupy those of the Yellow Arvicola (*Arvicola pallidus*), for wherever I have set traps at a collection of *Arvicolas'* holes I have caught some *Onychomys*, but evidently they dig holes for themselves, for I have caught them at holes where fresh dirt was thrown out every night. I suppose this species does not hibernate, for none of its near relatives do, though one that I caught was very fat. The fat, however, was not so much under the skin as it is in most, if not all, hibernating mammals. One which I kept in confinement was not full grown when caught. From the first it did not show the least fear. It took food from my fingers when first offered, and never attempted to bite. If not disturbed or very hungry it sleeps all day, and when waked up gapes, stretches, and blinks sometime before he gets fully awake, but is then lively for a time, though he does not seem to like the light, and if it is bright keeps winking. In the evening he becomes lively and tries to get out, jumping and scratching at the sides of his cage, and biting the wires of the front, but he never gnaws, and though he has been a week in a thin cigar box there is not a tooth-mark in it. Sometimes he becomes crazy in his efforts to get out nights, and jumps about with all his might; but usually, unless hungry, he is quiet and intelligent. He will come to the front of his cage at once if the wires are rattled or scratched and look for food. If a fly gets inside he is pretty sure to see it, and seldom fails to catch it. He will not eat raw meat, but the way he takes hold of grasshoppers and flies shows that they are not new to him. He ate 16 crickets, 11 grasshoppers, 1 spider, a black bug, and a big fly one forenoon. When very hungry he will eat weed seed or the leaves and stems of knot-grass and pigweed, but he has not been hungry enough for this many times since I have had him. He will also eat a little cheese and fried cake when hungry, but not much, and evidently does not relish it. His favorite food is crickets: he will not eat anything else while there is a cricket in his box. Next to crickets he will take grasshoppers or flies, but does not seem to care so much for beetles, though he will eat any kind that I have yet offered him, principally a small black beetle that lives under sticks and stones; he also eats lady-bugs. I have found only one potato bug since I have had him, and he seemed to relish that, as he ate it all but the wings, shell, and legs. He always begins at the head of an insect, holding it in his hands while he eats. A grasshopper will just nicely sit on its tail while he eats its head, with a hand on each shoulder; but the hopper is bound to kick, and if a large one, makes him much trouble, sometimes tipping him over: but he never lets go or stops eating until the head is off; then he eats his way to the tail. The wings and legs fall off as he eats the body out of them, and if he has plenty to eat they are left: but if hungry, and the supply is short, he will eat the legs afterward. He eats spiders, soft bugs, and dragon flies. He killed and ate a small frog when hungry, but would not touch one after eating all the hoppers he wanted. Next to insects he will take raw meat, fat or lean. He is very fond of brains. The only insects offered him which he would not eat were ants, and a few in his box make him almost crazy. If a dozen grasshoppers or crickets are put in his box alive he will kill them all by biting off their heads before he eats any. The same day that I caught him I dropped a dead White-footed Mouse (*Hesperomys leucopus*) into his box. He pounced upon it like a cat, caught it by the side of the head near the ear, and began biting with all the ferocity of a coon dog. I could hear the bones crack, and when he let go and seemed satisfied that it was dead I took it out and found quite a hole broken through the skull just below the petrous bone. His teeth must have penetrated far into the brain. I put it back and *Onychomys* began at once to gnaw through and pull off strips of flesh from the neck, shoulders, and skull, but did not get at the brain. He ate both of its eyes. The savage disposition shown in his manner of attack, and his promptness to seize it, would indicate a habit of killing mice. September 22.—At 7.43 a. m. I gave him 12 crickets and 1 spider. He had eaten them all in seven minutes. At 8 a. m. he ate 3 grasshoppers; at 10, 1 big fly; at 10.15, 4 grasshoppers and 4 crickets, and at 11.45, 4 grasshoppers and a black bug; total, 30 large insects in four hours. Did not have time to catch any more for him. September 25.—At 6.45 a. m. he ate 1 fly and 2 black beetles; at 7.30, 1 grasshopper and 18 crickets; at 10, 2 grasshoppers and 2 flies; at 12 m., 3 flies, 2 hoppers, and 7 crickets; at 1.30 p. m., 6 big blue flies; at 2, 3 big flies; at 2.30, 3 grasshoppers; and at 6, 3 crickets; total, 2 beetles, 8 grasshoppers, 15 flies, and 28 crickets, or in all, 53 large insects in less than twelve hours. He would have eaten more if he had had them.

September 28.—Put a small *Hesperomys* in his box and he served it in the same way that he did the other one; also gave him a Song Sparrow that I had killed; he bit it through the head and ate part of it. I gave him a black hornet, which he took and ate greedily, but the tail seemed to bother him, and he evidently got stung on the nose, but did not seem to mind it much. He is very fond of cream. September 30.—Gave *Onychomys* a common gray moth, which he ate and seemed to relish. October 3.—He ate a piece of another mouse of his own kind, and tried to eat it before it was skinned. He has settled one thing for me: that a squeaking cry which I heard evenings at Brown's Valley, and once or twice at Devil's Lake, was made by this species. He has made the same sound several times. It is something like the cry of a Flying Squirrel. Of 4 skinned, I was able to save but 1 without the loss of a patch of hair from the belly. Though the weather was cool, they would not keep more than six hours without the hair loosening over the belly. Most of those captured at Brown's Valley show one or more bare spots. I have noticed the same thing in Striped Gophers (*S. tridecemlineatus*) which had been feeding on grasshoppers. Probably insect food causes this tendency to early decomposition. The excrement of this species is easily known by the remains of insects it contains.

Montana.—Tilyou's Ranch, Dawson County, September and October, 1887: Common on prairies and hills; probably lives in the holes of some other mice.

Red-backed Mouse (*Evotomys gapperi*).

Minnesota.—Elk River, Sherburne County, November, 1887: Common. Brown's Valley, Traverse County, June and July, 1887: Very common. They live mostly in the banks of the Minnesota River, which is a narrow creek with high, steep, brushy banks. I found some in brushy ravines, and one on the prairie.

Dakota.—Fort Sisseton, Marshall County, June, 1887: Caught 2. Seem common in the brush land. Pembina, July and August, 1887: Common in the woods. Bottineau, August, 1887: Common; probably numerous along the creek. Caught one under a shock of wheat on the prairie. Deadwood, Lawrence County, October, 1887: Caught one on the mountain top, and saw some tracks in the soft snow.

Meadow Mouse (*Arvicola riparius*).

Minnesota.—Elk River, Sherburne County, November 28, 1887: At times very numerous, and again scarce; at present date unusually numerous. The only way that I can account for this is that when the water is high in the brooks and on the meadows, they are forced to leave their holes, and are destroyed by their natural enemies, while in the dry seasons they burrow in the brook banks and meadows. This year is very dry. When numerous they destroy much grain if left long in the shock, especially corn left standing all winter, sometimes eating it half up. They have killed a few apple trees for us by gnawing the bark around the bottom in winter when the snow was deep. Heron Lake, Jackson County, May 13–22, 1887: Caught one. Ortonville, Big Stone County, June 4–14, 1887: Probably common, although I found but few. Brown's Valley, Traverse County, June 21–July 8, 1887: Common in all low places.

Dakota.—Fort Sisseton, Marshall County, June 15–18, 1887: Common. Flandreau, Moody County, May 25–31, 1887: Found near a small slough on the flats of the Sioux River. Their paths extended in all directions through the grass, and were strewn with the grass which they had cut down for food, but I could find no holes or nests, and think they live under the dead and fallen grass which is thick in places. Bottineau (on western edge of Turtle Mountain), August 22–30, 1887: Common; not numerous. Fort Buford, September 1–20, 1887: Probably common where there are marshes, but there are none near here. Found one dead in the road, and saw one under brush and weeds in a ravine.

Pallid Meadow Mouse (*Arvicola pallidus*).

Dakota.—Fort Buford, September, 1887: The Pallid *Arvicola* seems to be common here, and shows a decided preference for the north side of steep hills. I have not found them on the south, southeast, or southwest side. The only reason I can suggest for this distribution is that the twilight (their favorite hour) is longer on the north side. The hills where I have found them are all steepest on the north side, which may have some effect, though there seems to be no difference in the vegetation on different sides. Like other *Arvicolæ* they have many holes, and probably live in families or colonies, although I have not caught more than one at a group of holes; but from the difficulty in catching them this does not signify anything (have caught only 4). Where there is grass or weeds their holes are connected by

beaten paths in the same manner as those of *Arvicola austerus*, but in many places they are in bare clay. Their food seems to consist largely of the flowers of certain plants, judging from the remains of flowers scattered around the holes and from the contents of their stomachs and excrement. When these plants grow near there are usually pieces of stems and blossoms of *Liatris graminifolia* and *Artemisia frigida* lying about, but many other plants and grasses seem to be eaten. They feed largely on the seeds of *Eurotia lanata*. I found a place near their holes where something had dug down to a partly eaten bulb of *Liatris graminifolia*. Probably these bulbs form a part of their diet, as is the case with *Arvicola austerus*. I placed corn, oats, cactus seeds, and seeds of weeds around their holes, but they remained untouched. The same was true of bread and cheese, and fried cake was seldom eaten. They seem suspicious of traps, and evidently leave their holes when traps are set near them. I have caught several *Onychomys leucogaster* and *Hesperomys leucopus sonoriensis* at their holes, and think these species either drive out the *Arvicolæ* or else inhabit the old holes.

Prairie Meadow Mouse (*Arvicola austerus*).

Dakota.—Rapid City (eastern edge of Black Hills), November 16, 1887: They are numerous in a few places, always in brush or weed patches on low prairies. They seem to live in colonies, and dig an immense number of holes, throwing out quite large piles of dirt.

Northern Prairie Meadow Mouse (*Arvicola austerus minor*).

Minnesota.—Brown's Valley, Traverse County, June 21–July 8, 1887: Common, probably on both sides, but I took it only on the Dakota side. Found where they had dug and eaten many wild onions (*Allium striatum*) and the bulbous root of a plant of the composite family, which I can not name. Ortonville, Big Stone County, June 6–13, 1887: Common on the high prairie: lives in holes, usually in small elevations of some kind, as old ant-hills or a bog. Elk River, Sherburne County: Common on high ground; never found on the low meadows with *Arvicola riparius*.

Dakota.—Devil's Lake, Ramsey County, August 6–19, 1887: Very scarce; caught 2. Bottineau (western edge of Turtle Mountain), August 22–30, 1887: Quite common; feeds largely on the bulbous roots of *Liatris graminifolia*, which is abundant all over the prairie.

Lemming Mouse; Cooper's Mouse (*Synaptomys cooperi*).

Minnesota.—Elk River, Sherburne County: Rather rare. Usually found on low meadows or near a brook; have never caught any in traps. Of the 7 or 8 specimens which I have taken, the first was dug out from under a tamarack stump on a wet marsh; 2 I caught in my hands while making hay, both on low meadows and near a brook. In the winter of 1886–'87 I took 3 or 4 from the cats, but do not know where they caught them.

Muskrat (*Fiber zibethicus*).

Minnesota.—Elk River, Sherburne County, 1887: Numerous; live in holes in banks of creeks and rivers, and in houses which they build in ponds and lakes. They eat fresh-water mussels, small turtles, and lily roots. The mussels eaten are both the thin-shelled kind of the mud-bottomed lakes and the heavy-shelled of rivers (*Unio*). Some trappers use mussels for bait. The turtle eaten by Muskrats is a small bright-colored terrapin, probably *Chrysemys picta*. Three or four years ago I took from a Muskrat house a small turtle with three of its legs and its tail eaten off and the shell gnawed. It was still alive. The lily roots eaten are *Nymphæa tuberosa* and *Nuphar advena*. They form a large part of the food of Muskrats in winter when the ponds are frozen.

Minnesota and Dakota.—Red River Valley: Common at all points visited, from the south end of Big Stone Lake north to Pembina.

Dakota.—Flandreau, Moody County, May, 1887: Common. Fort Sisseton, Marshall County, June, 1887: Common. Devil's Lake, Ramsey County, August, 1887: Common. Rapid City, Pennington County, November, 1887: Common along the creeks.

Montana.—Tilyou's Ranch, Dawson County, September and October, 1887: Found holes and excrement of a few along a creek.

Little Gray Rabbit (*Lepus sylvaticus*).

Minnesota.—Elk River, Sherburne County, November, 1887: Common in and around the towns; rather scarce in the country. I do not think they were here eight years ago. Heron Lake, Jackson County, May, 1887: Common. Ortonville, Big Stone County, June, 1887: Common in the brush and around town. Brown's Valley, Traverse County, June and July, 1887: Common in the valley and ravines.

Dakota.—Fort Sisseton, June, 1887: Common. Fort Buford, September, 1887: Common in the brush of the river flats and ravines. It follows paths through the brush, but does not keep well-beaten trails like those of the Varying Hare (*L. americanus*). Rapid City, Pennington County, November, 1887: Quite common.

Montana.—Tilyou's Ranch, Dawson County, September, 1887: Numerous in the brush.

Varying Hare (*Lepus americanus*).

Minnesota.—Elk River, Sherburne County, November, 1887: Common.

Dakota.—Grand Forks, July, 1887: Said to occur. Pembina, July and August, 1887: Common. Bottineau (in western border of Turtle Mountain), August, 1887: Evidently numerous. The hazel brush on the hills is all cut off at about 2 feet from the ground, and the ground is strewn with excrement of this species and that of *L. campestris*, which is about four times as large.

Jack Rabbit (*Lepus campestris*).

Minnesota.—Heron Lake, Jackson County, May, 1887: Said to occur. Ortonville, Big Stone County, June, 1887: Said to be quite plentiful here, but I have failed to find them. Brown's Valley, Traverse County, June and July, 1887: Common on both sides of the valley.

Dakota.—Flandreau, Moody County, May, 1887: Saw two; one was young and about the size of the Little Gray Rabbit (*L. sylvaticus*). Fort Sisseton, June, 1887: Said to be common: saw one, but could not get within 60 rods of it. They keep on the open prairie and are as wild as deer. The people here think the only way they can be captured is with greyhounds. They have been killed off until they are now very scarce. Grand Forks, July, 1887: Said to occur. Fort Buford: Common on the prairie. Pembina, July and August, 1887: Said to be common; saw but one. Devil's Lake, Ramsey County, August, 1887: Seem to be common. Bottineau (western edge of Turtle Mountain), August, 1887: Common. Rapid City, Pennington County, November, 1887: Common. Shot one that I scared from an excavation it had made in hard clay in the midst of a Prairie Dog town where there was not a weed or blade of grass for protection. Still, it resembled its surroundings so closely as it squatted in the hole with its ears laid flat and its back level with the ground that I walked close to it without noticing it till it jumped and ran. The excavation measured 5 inches in depth, 6 in width, and 12 in length. This is the fourth Jack Rabbit I have scared out of just such a hole. I think they sit in the same place every day if not disturbed, but have not known one to return after being frightened.

Montana.—Tilyou's Ranch, Dawson County, September and October, 1887: Common; eat cactus berries. Stage road from Miles City to Deadwood, October, 1887: Common all along; saw a few.

Eastern Porcupine; Black-haired Porcupine (*Erethizon dorsatus*).

Minnesota.—Elk River, Sherburne County, 1887: I have unquestionable authority for the killing of two in this county. They are said to be common in the evergreen timber 50 miles north.

Western Porcupine; Yellow-haired Porcupine (*Erethizon epixanthus*).

Montana.—Tilyou's Ranch, Dawson County, September, 1887: Common in the undergrowth on the river flats, feeding principally on bull-berry leaves and berries, and cottonwood bark. I found one under a brush heap. The small limbs with berries had been cut off from many of the bull-berry bushes near the place. Its stomach was full of bull-berry leaves and berries, and contained nothing else. It was very fat. I crawled under the brush heap and poked it with a stick. When annoyed this way it would strike with its tail in all directions, up, down, and sideways, striking hard; its tail would thump on the ground as loud as a blow from a man's fist. After it

had been striking with and switching its tail I found a number of quills scattered over the ground for a distance of 2 feet from it. They were probably knocked off from the tail when it struck the ground or sticks. It did not offer to run, but curled its nose down and under, arched its back, and struck with its tail at everything which touched it. I found another under some thick, low bull-berry bushes. It was an adult female, very fat, and weighed 19 pounds. Its actions resembled those of the first, except that when disturbed it ran to another thick bunch of bushes about 10 rods away and when approached ran back again. Its stomach was full of bull-berry leaves and berries and cottonwood bark. Both of these individuals had a strong smell, which I think came from their food, for the contents of their stomachs smelled the same, ands tronger. The people here kill them at sight, on the supposition that they destroy the timber by gnawing the bark from the green trees, but I have not found a tree that they have injured, and I have spent much time in the woods here; have tramped all over a large part of the river bottoms where Porcupines are most common, but found no sign of their work except where they had cut branches from the bull-berry bushes to get at the leaves and berries. Their eyes are small; iris brown; pupil large and blue, so the eye looks blue.

Jumping Mouse (*Zapus hudsonius*).

Minnesota.—Elk River, Sherburne County, 1887: Common.

Dakota.—Flandreau, Moody County, May, 1887: Saw one. Harwood, Cass County, July, 1887: Found two in a nest near a wheat-field; the nest was made of fine grass, and concealed under some fallen grass of last year; the entrance was on the side; the nest was placed in a small depression scooped in the ground. Pembina, July and August, 1887: Common in weedy places. Devil's Lake, Ramsey County, August, 1887: Common near brush and in weedy places. Fort Buford, September, 1887: One found on a nest of fine grass, under fallen weeds and brush; it was an adult male and exceedingly fat.

Yellow Pocket Mouse (*Cricetodipus flavus*).

Minnesota.—Brown's Valley, Traverse County, June and July, 1887: Caught one July 1 on the prairie on the Dakota side, about 80 rods west of the Minnesota line. It was about two-thirds grown, and its cheek pouches were full of the seeds of knot-grass (*Polygonum aviculare*), among which it seemed to be feeding. Saw another in a marsh on the flats, but could not get it.

Dakota.—Fort Buford, September, 1887: Caught one here.

Montana.—Tilyou's Ranch, Dawson County, September and October, 1887: Common; live in holes which they dig in weed patches on the prairie; they come out to feed about sundown and at daylight; they feed on small seeds of weeds, mostly pigweed, but will not take bait. They are fond of the seed of knot-grass (*Polygonum aviculare*), but pigweed seed is their favorite food, and they are generally found in or near a patch of it; I have killed them with their pouches packed full of it. I caught 6 in my hands. Their holes are smaller than those of any of the Mice, and usually are in clusters. Skunks dig out their holes and probably are their worst enemy.

Pocket Rat; Kangaroo Rat (*Dipodomys agilis*).

Montana.—Glendive, Dawson County, October, 1887: They live in holes in a mound of earth that has been thrown out of a railroad cut; their holes are about the size of those made by the Striped Gopher, but are very different in appearance—more like those of the House Rat. They are connected by well-beaten paths. Most of them enter the ground in nearly a horizontal direction. Usually a little fresh earth is thrown out every night. A few of the holes are stopped up through the day, like a Pocket Gopher's hole, but they seem to be opened every night, when more dirt is thrown out. At these there is always the largest pile of dirt. I opened one, set a trap in it, and caught an adult *Dipodomys*. At some of the holes they have thrown out much of a kind of fine, short, prickly grass, but whether it was taken in the holes for a nest or for food I could not tell. Their food seems to consist principally of the seeds of grasses and fine weeds. They seem to be strictly nocturnal, for though I have kept traps set night and day, I have not caught one in the early evening or near daylight in the morning. One evening I remained at the place until too dark to see a rat at my feet, but I did not see one, nor was one in any of the traps when I left. They are not fat at all, and by this I judge they do not hibernate. Have not found anything in their pouches, but some had grass seed in their mouths when caught. They are easily caught in steel traps set in the dirt

at the mouth of a hole. Just back of their shoulders there is a small elongated bare spot, which shows plainly from the wrong side of the skin, and seems to be composed of little round glands or dots.

Pocket Gopher (*Geomys bursarius*).

Minnesota.—Elk River, Sherburne County, November, 1887: Abundant; most numerous on the lightest and sandiest soil, and the poorer the soil the more they dig. They are considered a great pest. They do not destroy much grain by eating it, though sometimes they get into a shock of wheat and eat the heads of a few bundles. When their holes run through a hill of potatoes, they always clean out the hill. Sometimes they do noticeable damage in a patch of potatoes; I have seen where one Gopher had eaten the potatoes out of about a dozen hills, never more. But the greatest damage they do is in covering small grain and grass with the earth which they throw from their holes; the damage done in this way is often considerable. I once counted the hills thrown up by three Gophers twelve days after a rain. The number of fresh hills was, respectively, 28, 35, and 40. As near as I could judge without measurement, the hills averaged about 6 quarts of dirt each, and each covered about 1 square foot of ground. Pocket Gophers work mostly by night. They continue throwing up hills all the time a crop is growing. One Gopher to the acre will cover a large area of grain, but probably they will not average one to the acre except where most numerous.

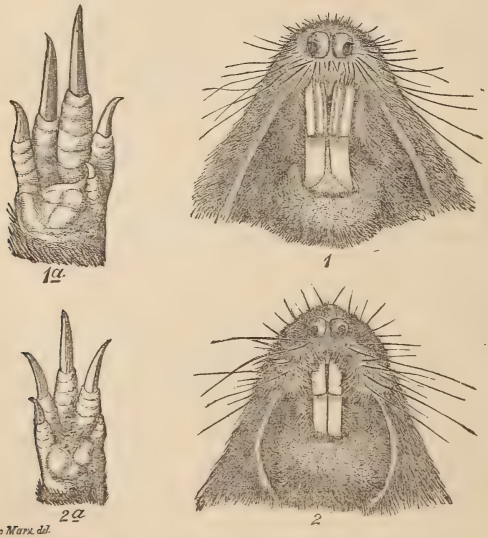

Fig. 1. Pocket Gopher (*Geomys bursarius*). 1. Face, showing grooved upper incisors and opening of external cheek pouches. 1*a*. Fore foot.

Fig. 2. Gray Pouched Gopher (*Thomomys talpoides*). 2. Face, showing plane upper incisors and open-opening of external cheek pouches. 2*a*. Fore foot.

[Drawings from alcoholic specimens.]

In fields where the soil is shallow the continuous throwing up of the dirt below the soil is said to injure the producing qualities of the land, but I do not feel certain that it is so. I think it probable that their plowing the land over and over for ages past has much to do with its fertility, at any rate with the depth of soil. They have spent their lives in preparing the ground for man, and now he spends his time in trying to get rid of them. But this is not hard to do, nor does it take much time, for of all animals they are the most easily trapped, as they live almost entirely under the ground, and extend their holes slowly. When all in a field have been caught, others do not get in it again soon. In the spring many of them leave their holes and travel above ground: these are probably the males. Sometimes they leave one hole and start another, but usually I think one Gopher stays in its hole all summer. I have

never found more than one in one set of holes. They lay up large stores of food for winter, mostly roots and stems of weeds cut into short pieces. Round Lake, Nobles County, May, 1887: Numerous. Heron Lake, May, 1887: Present, but not in sufficient numbers to do much harm. Ortonville, June, 1887: Common in the hollows and on the low ground; rare on the high prairie. Brown's Valley, Traverse County, June and July, 1887: Common on both sides; keep mostly on low ground, very numerous in the valley.

Dakota.—Flandreau, Moody County, May, 1887: Numerous. Fort Sisseton, June, 1887: Common. Grand Forks, July, 1887: Quite common along the river bank and railroads; a few in the fields. When in grain-fields they run long, crooked tunnels about 2 inches below the surface, and coming out at short intervals, cut down the grain and carry it into their holes. Many of the holes for a distance of several feet are packed full of grain stalks, and seem to be used only to store grain in. Most of the grain is cut into pieces, about 1 or 2 inches long, but some whole stalks are drawn in. Their object seems to be to fill the holes with a supply of food to be eaten at leisure, but much more grain is drawn into the holes than can be eaten while fresh, for on examining old holes I found them full of moldy stalks. I am not sure what part they eat, for they leave a great deal of all parts. I think they eat stalks and all, but mostly the heads.

Dakota.—Devil's Lake, Ramsey County, August, 1887: Common. The principal damage they do is in meadows. Harwood, Cass County, July, 1887: Common along the railroads, and occasionally in the woods near the river bank.

Gray Pouched Gopher (*Thomomys talpoides*).

Minnesota.—Saint Vincent, August 31, 1887: Common.

Dakota.—Pembina, July and August, 1887: Common everywhere. Occurs on the Manitoba side of the boundary, and on the Minnesota side of the valley. As a rule this species avoids cultivated fields. I have found but one place where it was living in fields of grain, and this one had cut down the grain near its hole and carried it below ground, stalks and all, just as *Geomys* does. Though abundant here, this was the only instance where I found it in a field. They seem to prefer the wild plants on the prairies, especially *Psoralea argophylla*, a species of wild clover with long pulpy roots, that grows abundantly all over the prairies, except in low grassy places, where neither it nor the Gophers are found. These roots have so strong a smell that it is imparted to the Gophers, so that they smell as strong as the roots. Specimens caught in the woods lack the smell entirely. The other food which I have found them eating was the leaves, stems, and roots of various weeds and grasses. They are most numerous along the weedy ridges, while *Geomys* prefers low ground and marshes. *Thomomys* are much easier to catch than *Geomys*, and do not fill their holes with dirt so far down. I can dig any of them open with my fingers. *Thomomys* are not half as large as *Geomys*. Their manner of throwing up hills differs from that of *Geomys* in several ways: (1) The single hills average about half as large as those of *Geomys*; (2) they generally form a cluster or group, instead of a line, and consequently are less progressive (a cluster of hills where a Gopher has evidently worked all summer seldom extends more than 5 or 6 rods); (3) they often open the hole and throw out dirt several times in the same place, making irregular hills of various sizes. Sometimes, though not generally, a Gopher throws out the dirt through the same hole every night (filling the opening through the day), until it has formed a pile of a bushel or more; then throws up another at a long distance from the first. The farthest apart of connected hills that I have measured was 27 feet, generally less. This seems to be their way of traveling. No small hills are found near the very large ones, but these seem to be connected by a straight hole which continues in a certain direction. Following are the dimensions of some of the large hills: 4 by 4 feet, and 10 inches high; 4 by 5 feet, and 9 inches high; 3 by 3 feet, and 7 inches high; 4 by 5 feet, and 6 inches high. They must breed earlier than *Geomys* or get their growth sooner, for their young are very nearly full-grown now (August 3), while the young of *Geomys* are about half grown. The following statement shows the number of developed teats in the adult females examined; all had been nursed this season: 3–4, 4–5, 4–5, 4–5, 4–6, 5–5, 5–5, 5–6, 5–6, 6–6, 5–7. Devil's Lake, Ramsey County, August, 1887: Common, but not so abundant as at Pembina. Here, as at Pembina, they avoid the marshes, where only grass grows, and cultivated fields. One group of their hills in a marsh and two in a stubble-field are the only ones I have found, although I have been over many fields and marshes, and find them common at the edges. In one field that was broken this summer (about 40 acres) I could not find a hill, though many Gophers must have been there before it was plowed. Evidently their holes run so near the surface that a plow destroys them and the Gophers leave. The principal damage done by *Geomys* is in meadows, and

if *Thomomys* lives neither in meadows or fields, which is the case so far as I have observed, they are practically harmless. Their food here seems to include nearly every plant that they find, but they show a decided preference for leguminous plants, especially for the roots of *Psoralea argophylla* and *Glycyrrhiza lepidata*. They also eat the roots of asters and milkweeds. Probably their greatest enemy is *Putorius longicauda*, two of which I caught in their burrows. Bottineau (on western border of Turtle Mountain), August, 1887: Numerous (as common as at Pembina). Feed largely on the roots of *Psoralea argophylla*, which is abundant. Found places where three of them were at work in a stubble-field, and one of them had only thrown up one hill; so they must have come there since the grain was cut. Fort Buford, September, 1887: Common, ranging from the water level in the ravines to the tops of the highest hills; often found where there is scarcely any vegetation. Deadwood (in northern part of Black Hills), October, 1887: One has thrown up hills near here, but I failed to catch it. Rapid City (on eastern edge of Black Hills), November, 1887: Common. For the first time I find them doing enough damage to be worth noticing. They range from the lowest ground to the tops of the highest hills, but are most numerous on the creek flats, which might be called low prairie or high meadow land. This is valuable because it is the only land here that will produce anything worth raising, and most of it is under cultivation or else fenced in to protect the wild grass, which grows thick and makes an excellent quality of hay, probably equal to timothy. It is in these wild, dry meadows that *Thomomys* are most numerous and damaging. The principal damage they do is occasioned by covering up the grass with earth from their holes, and perhaps to some extent by cutting off the roots. In one meadow of about 20 acres there were 10 Gophers, as nearly as I could estimate by their work, and they have thrown out on an average about 20 hills each since the hay was cut. Each of these hills covers from 1 to 4 square feet of ground and grass. I have found the works of but one in cultivated fields here, and that was near the edge.

Montana.—Tilyou's Ranch, Dawson County, September and October, 1887: Common everywhere. Stage road from Miles City, Mont., to Deadwood, Dak., October, 1887: Hills common all the way.

DESCRIPTION OF LOCALITIES VISITED BY VERNON BAILEY DURING THE SUMMER OF 1887.

Heron Lake, Jackson County, Minn.

Heron Lake, in Jackson County, Minn., is a very irregular body of water, about 14 miles in extreme length, and varying from a narrow channel to 3 miles in width. It is very shallow, being nowhere more than 6 feet deep. The bottom is clay. Along the southwest side, and occupying a large space between the north and south divisions of the lake, is a great field of reeds (*Phragmites communis*). In some places the reeds are tall and dense; in others scattering and interspersed with coarse grasses, flags, and rushes, all growing in water from 6 inches to 2 feet deep. At some seasons the marsh is nearly dry. Its area is about equal to that of the lake. Several creeks flow into the lake; its outlet is the Des Moines River.

The surrounding country is gently undulating prairie, which contains numerous shallow sloughs. The soil is all clay. Along the east shore of the lake are some scattered groves of native timber. The largest, some 8 or 10 acres in area, is mostly box elder, hackberry, elm, and plum; some of the trees are 2 feet in diameter. The rest of the prairie is bare of timber, except the groves of cottonwood that have been planted.

Brown's Valley, along the boundary between Minnesota and Dakota (partly in Traverse County, Minn., and partly in Roberts County, Dak.).

Brown's Valley is a continuation of the depression occupied by Big Stone and Traverse Lakes, which are now about 4 miles apart, but which evidently at one time were one lake, or more likely a river. The valley is about 2 miles wide (as are the lakes throughout their length), and but a few feet above the water level. Water is said to flow from Traverse to Big Stone during spring freshets. By late measurements the water level is said to be 9 feet higher in Traverse than Big Stone. The lowest parts of the valley flats near the lakes are covered with coarse grass and reeds, and in the middle, where higher, with grass, weeds, and thickets of snow-berry bushes.

The Minnesota River is a small, rapid creek, entering the flats from the west about 2 miles from the south end of Lake Traverse. It flows through a deep,

crooked valley in the prairie, which contains much brush and small timber and occasional grassy flats. Along its course through the flats its banks support a thick growth of brush and small trees, mostly willows, box elder, and plum.

The prairie which bounds the lakes and flats rises as a steep bank probably more than 200 feet above the level of the lakes, and is cut into by numerous ravines which are washed out by water and contain more or less timber and brush. There are no sloughs. The soil is mostly gravelly clay. Along the edge of the prairie are numerous Indian mounds and earth works.

My observations were made principally on the prairie on both sides of the valley, and along the brushy and wooded valley of the Minnesota River, west of Lake Traverse; also in a wooded ravine on the east side, 1 mile from the south end of Lake Traverse.

Flandreau, Moody County, Dak.

The country about Flandreau is all prairie, except along the river bottoms, where there are strips and thickets of brush with a few trees. There are no sloughs or marshes except a few old river courses on the flats. The surface is quite hilly near the river flats, but back from these is mostly level. The soil is a gravelly clay.

Ortonville, Big Stone County, Minn.

Ortonville is situated on the east side and near the south end of Big Stone Lake. The lake is about 35 miles long and from 1 to 2 wide. The shore is mostly steep and stony, but in some places is low and bordered with coarse grass, rushes, and reeds. From the shore of the lake the ground slopes back gradually a little way, and then rises in a line of very steep, high hills, or rather banks, for they rise only to the level of the prairie, which is about 150 feet above the lake.

There is a growth of small timber and brush on the low ground near the lake, on the points of land extending into it, on the islands, and in the numerous ravines which extend back into the high ground. But few of the trees are large. The principal kinds are basswood, box-elder, elm, and ash, with a few bur-oaks. The surrounding country is all prairie, slightly rolling and with some small marshes, but I have not seen any sloughs. The soil is mostly clay; it is very stony, with granite and lime-rock bowlders. Springs of very cold, pure water are numerous all along the foot of the hills and in the ravines, where they form little brooks. The land is rich, and the prairie is covered with a thick growth of grasses and other plants, many of which are decidedly western. Species of the pulse family abound, especially *Astragalus caryocarpus*.

Fort Sisseton, Marshall County, Dak.

The country about Fort Sisseton is much broken, often rising in high hills, with numerous large sloughs which are strongly alkaline. Generally the slopes are long and gradual, but in some places, especially near the sloughs, they are steep and bank-like. There is no drainage system, not a creek or river for 35 or 40 miles. The soil is gravelly clay, very productive, and vegetation is generally rank.

Patches of thick brush and scrubby trees, mostly oak, bass, and ash, occur along the borders of the sloughs, and in some places over the hills. Occasionally there is a large oak, elm, or cottonwood, but large timber is scarce.

Harwood, Cass County, Dak.

The land about Harwood is level prairie, unbroken, except by the timber along the streams, which is continuous and from one-half to 1 mile in width. This timber is mostly elm, box-elder, willow, and oak, and many of the trees are large and thrifty. The river flows between high, steep banks. The open land is all under cultivation. The fields of wheat, oats, and barley form one almost continuous body and yield large crops.

Animal life shows more of the characteristics of timber than of prairie land. Some species, not being crowded into small groves as on the prairie generally, are not so numerous, while others occur which are not met with in any of the localities previously visited.

Grand Forks, Grand Forks County, Dak.

The region about Grand Forks is a level prairie, about 25 feet above low water in the Red River. There is a strip of timber (bur-oak, cottonwood, basswood, elm,

ash, and box-elder predominate) about half a mile wide along the river. During the high water the river rises nearly to the level of the prairie, but never overflows. The water is slightly alkaline. The soil is clay, very stiff. The prairie is mostly under cultivation, the principal crops being wheat, oats, barley, and grass; they yield heavily.

Animals that inhabit timber land seem to be most numerous, those of the prairie being rather scarce; probably owing to the low, damp ground, where water stands after heavy rains. Possibly alkali affects the distribution of mammals, but I can find no proof of it.

Pembina, Pembina County, Dak.

The level of the prairie at Pembina is about 25 feet above low water in the Red River. The surface is everywhere undulating, with about 18 inches difference in the level. On the prairie the ridges and hollows are quite regular, and are plainly marked by a difference in vegetation, grass only growing in the hollows and various plants and weeds on the ridges. Along the river the land is uneven and ridged by water. The soil is black, rich, and productive; subsoil very sticky, and when wet and worked, very hard clay. A rich growth of vegetation covers the prairie. A line of timber extends along each river, varying in width from 2 miles to less, and in most places full of thick underbrush. The principal trees are elm, box-elder, willow, cottonwood, and a few oak and basswood. The principal undergrowth consists of hazel (full of nuts), June-berry, choke-cherry (full of fruit), high-bush cranberry (full of fruit), black haws (fruit not ripe yet), thorn bush (full of fruit), raspberries, and other brush. The timber is generally smaller and more brushy than at Grand Forks. On the east side of the Red River there is very little except poplar and willow brush, and this, interspersed with dry, grassy marshes, extends about 4 miles east of the river, and is only separated from the great timber region of Minnesota by about 7 miles of prairie. I have seen but one slough (4 miles west of Pembina), and it is small and shallow, but surrounded by a large tract of coarse grass. The crops are generally good. I think wheat will be ready to cut about August 8 or 10, if not sooner.

My observations have mostly been made in the timber and brush along the Pembina River, over the prairie west and north for a distance of 4 or 5 miles, and in the brush and meadow land on the east side of the Red River.

The weather since I have been here has been clear, with pleasant days and cool nights. There was a light frost July 22, but no damage was noticeable.

Devil's Lake, Ramsey County, Dak.

Devil's Lake is a large body of water in Ramsey and Benson Counties, northeast Dakota. The surface of the surrounding country is variable. There are hills and gently rolling prairies, interspersed with marshes, and near the lake are large areas of level, sandy, and salt-incrusted land, with scant vegetation. The lake is very crooked and irregular in outline, with sandy or reedy shores. All the points, peninsulas, and islands, besides some strips along shore, are covered with heavy timber and thick brush. There are some solid bodies of forest, many square miles in extent. The timber is largely bur-oak, box-elder, and elm. Among the brush there is an abundance of June-berry bushes, choke-cherries, wild plums, wild currants, and raspberries.

The soil is clayey and productive. Crops generally are good. No streams flow out of the lake. The water is clear, but slightly salty, and a crust of salty matter is deposited on stones or whatever the water washes along shore, and on the sand that is near the level of the lake. The surrounding prairie is about half under cultivation, the principal crops being wheat and oats, probably three-fourths wheat and one-fourth oats.

My observations have been made along the lake shore, in the timber, and back over the prairie for a distance of 5 or 6 miles, including as different physical features as possible. In physical features, plants, and animals there is a strong resemblance between this and the Fort Sisseton region.

Bottineau, Bottineau County, Dak.

The little town of Bottineau is on a level prairie, about 2 miles from the Turtle Mountains, which rise with a slope of about a mile to a height of probably 1,000 feet above the surrounding prairie. They form a plateau that is moderately hilly on top and cut through by some deep ravines. The hills are mostly covered with thick brush, and in places, especially in the ravines, there is straggling timber, mostly pop-

lar, box-elder, elm, and bur-oak. Among the brush is an abundance of June-berry bushes, choke-cherries, wild red cherries, and high-bush cranberries, the last four now loaded with ripe fruit. The bur-oaks are full of acorns, down to bushes four feet high.

There are said to be many lakes farther back in the hills than I have been. A small creek comes down through a deep ravine in the mountains, and flows near the town in a southwest direction across the prairie. Along its banks are thick brush and a few trees. The prairie is quite level, and covered with short, fine grass. There are no sloughs or lakes near here.

Crops are good, and consist principally of wheat and oats.

Fort Buford, Buford County, Dak.

The fort is situated near the left bank of the Missouri River, opposite the mouth of the Yellowstone. It is on a level prairie—the second river flat—which is about a mile wide and 4 or 5 long, running parallel to the river, and averaging about 20 feet above the bank. Extending most of the way between this and the river is another flat, on a level with and forming the river bank, which is about 15 feet above low water. This lower flat is covered with a dense growth of brush and trees. The principal trees are cotton-wood, box-elder, and black ash: the brush is largely willow, some thorn, rose, choke-cherry, and a thorny bush called bull bush or bull-berry bush, which is now loaded with fruit—a small red berry of pleasant taste.* This flat varies from a half mile in width to less, and the brush is so thick and large as to be almost impenetrable, except as roads are cut through it.

From the farther side of the prairie (back from the river) steep, high hills rise to a height of probably 1,000 feet above the river. Deep ravines, with steep or perpendicular sides and full of brush (largely choke-cherry and bull-berry), cut through these hills and through the prairie, running down to the river. In the bottom of each ravine is generally a small brook which goes dry between rains.

The hills are mostly covered with a very scattering growth of fine grass and small weeds, but in places are bare clay or soft sandstone, without vegetation and in curious shapes from the wearing away of the softer parts, leaving them with steep or projecting sides.

In the valleys between the hills (not the ravines) and on the prairie there is a good grass for pasturage, some sage brush, various weeds, and cacti, some of which are of interest as forming food for birds and mammals—particularly a wild sunflower (*Helianthis rigidus*).

The first frost was recorded September 15.

Tilyou's Ranch, Dawson County, Mont.

Tilyou's Ranch is situated on the Yellowstone River, 26 miles from Fort Buford, Dak. The river valley is about 5 miles wide, generally level. It is inclosed by high hills, scantily covered with vegetation: on the east side the hills are very steep, rough, and bare. Good grass grows along the creeks and on low places: elsewhere vegetation is stunted and scarce. The river flats are covered with willow and bull-berry brush and cottonwood timber. The general features and animal life are much the same as at Fort Buford.

During my stay of thirteen days the weather has been clear, dry, and pleasant, with cool nights and warm days.

DESCRIPTION OF THE BAD LANDS OF DAKOTA AND MONTANA, OBSERVED FROM FORT BUFORD TO MILES CITY.

This region has the appearance of having been a great plain, slightly rolling, and deposited to a depth of at least 1,000 feet in quite regular layers, from 4 to 50 feet thick, principally of soft, gray sandstone (sometimes rusted or colored), and a peculiar gritless, hard, but when wet sticky and slippery, clay called "gumbo."

The change from a level, sloping plain to the curiously-formed and most intensely uneven surface now presented is the result of erosion. The rivers have cut through the soft sandstone and clay, until at present they are from 600 to 1,000 feet below the original level of the plain. This gives the branches and small side streams a steep descent to the main rivers, and they have cut down deep gorges through the sandstone and "gumbo," which are of sufficient solidity to retain, in this very dry climate, very steep or quite perpendicular sides, on which little or nothing grows.

* This proves to be the Buffalo berry (*Shepherdia argentia*).

Back from the level valley of the Yellowstone River, which is generally 4 or 5 miles wide, the land rises in what would be a great wall, but it is all cut up into bare peaks and humps, which farther back have flat tops, showing the plain level, and which increase in size until far back from the valley they run together and form the plain. The sides of these peaks and spurs show the different strata through which the water has cut, and as these strata are of different degrees of hardness they resist erosion unequally, producing the curious shapes which always excite the wonder of the visitor. The effect is heightened by different color combinations, the sandstone being light gray, the "gumbo" brown, the strips of coal black, and a kind of shelly stone pink. Viewed from a distance the bad-lands remind one of some old closely-built city, with towers, castles, and forts. If there was as much rain here as in the Mississippi Valley these hills would be smoothly rounded and covered with luxuriant vegetation.

In the valleys and on the plain there is a rather scattering growth of short, fine grass and sage brush, but on the hills below the plain level there is very little vegetation, at a distance apparently none. Sage brush and a few other small plants grow on some of the most sloping sides, but more of them are perfectly bare. In some places red cedars, very short and scrubby, grow in the nooks and along the edges of the hills.

Deadwood, Lawrence County, Dak.

The town of Deadwood, in the northern part of the Black Hills, is situated in a deep, narrow valley or gorge, through which runs a rapid creek of red water that looks exactly like blood. It takes its color from a red clay through which it runs. The hills rise high and steep from the valley, probably to a height of 2,000 feet from their base, and are covered with pine, spruce, and brush. The timber is scattering, and much of it has been cut. The hills are stony, and at the tops of most of them are ledges or peaks of rock, with many cracks, crevices, and holes. Wherever there is soil over the rock vegetation is abundant. Grasses, wild rye, golden-rod, asters, snow-berries, a small rose bush, and numerous other plants and shrubs cover the hills. There are also birch, hazel, and a kind of scrubby oak. My field work at Deadwood was done on the mountains within a few miles from the town.

Rapid City, Pennington County, Dak.

Rapid City, on the eastern edge of the Black Hills, is in the Rapid Creek valley, just where it leaves the pine-covered mountains and enters the more level and treeless prairie region. The hills to the west are high, steep, and rocky, covered with jack and yellow pine, and in some of the ravines there are a few scrubby ironwood and oak trees and brush. The prairie may be divided into low, level, and fertile creek valleys (where the farms are), and high, dry, and unproductive tablelands and hills covered with short grass. The descent is steep and the creeks very rapid. The soil is good, but there is not enough rain during the season to make farming a success, except on the lowest land, unless by irrigation.

The weather from November 1 to 16 was steadily clear, with warm days and freezing nights.

NOTES ON THE DEPREDATIONS OF BLACKBIRDS AND GOPHERS IN NORTHERN IOWA AND SOUTHERN MINNESOTA IN THE FALL OF 1887.

By Dr. A. K. Fisher, *Assistant Ornithologist.*

BLACKBIRDS.

At Round Lake, Minn., most of the Blackbirds had gone by the end of September, but their work was plainly visible in every cornfield. Mr. D. W. Lounsbury pointed out the results of their depredations in his own fields, and devoted considerable time to driving around to neighboring farms that a number of fields over a comparatively large area might be examined. All had been more or less damaged. The loss was estimated at from 5 to 50 per cent. of the crop.

One farmer made the statement that out of all corn husked in a previous year there were few cobs which contained more than an inch or two of grain at the base, the rest having been removed by the birds.

The time when most of the damage is done is when the kernels are soft and milky. The birds readily tear through the husk and reach the grain. The heavier ears, which by their weight take a horizontal position, suffer most, as the birds can gain a better footing than on the vertical ones.

Certain portions of a field, or fields in certain localities, suffer more than others. Sides of fields facing sloughs, or fields surrounded by them, and portions away from farm buildings suffer more severely than those favorably situated. Little damage is done to corn after the kernels harden. A few fragments were found in the stomachs of birds captured in the field about the 1st of October, but the larger part of the contents of the stomachs consisted of the seeds of the Fox-tail grass (*Setaria*).

Oats and wheat were said to be eaten by Blackbirds, but the greater damage done to these grains is by Gophers.

The chief reason why the Blackbirds, which are mainly Red-wings and Yellow-heads (*Agelaius phœniceus* and *Xanthocephalus xanthocephalus*), are so troublesome in this locality is that so small a proportion of land is planted to corn compared with the vast amount of surrounding prairie. The rank vegetation bordering the lakes and sloughs on the unimproved land furnishes safe retreat for nesting and roosting, from which the birds make frequent inroads upon the neighboring isolated corn-fields.

The same state of affairs existed at Storm Lake, Iowa, some years ago, before corn was so extensively raised as at present. Now the loss is very little felt on account of the large area under cultivation.

In endeavoring to lessen the damage done by the Blackbirds some farmers shoot large numbers as they go to and from the fields, and the frequent firing is thought to frighten a good many away. Others use poison alone or in connection with fire-arms.

Strychnine is the favorite poison. It is placed in water with a quantity of green corn cut from the cob; the mixture is allowed to soak for some hours. A few kernels of this poisoned grain are placed on the ears that have been damaged by the birds in the fields. When the birds return they are supposed to eat the loose grain which they find. One farmer who had tried this method, and who visited their roosting places, reported a number of dead birds.

GOPHERS.

Although the damage done by Blackbirds is very great, and the total value of the grain destroyed by them reaches a high figure, it is doubtful whether it exceeds in amount the losses occasioned by Gophers.

In southwestern Minnesota and northern Iowa there are three species of Gophers, namely, the Gray Gopher (*Spermophilus franklini*), the Striped Gopher (*Spermophilus tridecemlineatus*), and the Pocket Gopher (*Geomys bursarius*), the last species being by far the most destructive.

The Gray and Striped Gophers are more or less alike in habits, living a considerable portion of the time above ground and feeding on the same substances. Where abundant, as they are in many parts

of the West, they destroy large quantities of corn, wheat, oats, and the seeds of flax. They also feed to some extent on seeds of wild plants, even when grain is plenty. A Striped Gopher shot at Heron Lake near a field of wheat stubble had its pouches full of the seeds of the ragweed (*Ambrosia artemisiæfolia*).

In view of the fact that large numbers of these animals are shot and handled it is surprisingt hat they are not used as an article of food. Their flesh is as sweet and delicate as that of the arboreal Squirrels, which are held in high esteem as a game dish in many parts of the East. The farmers agree that they ought to be good to eat, but it was impossible to learn of any one who had tried them. The Pouched Gopher, whose habits are entirely different from those of the Striped or Gray Gophers, lives in extensive underground galleries, rarely comes to the surface, and commits depredations rivaling in extent those of the Blackbirds.

Both at Storm Lake, Iowa, and Round Lake, Minn., complaints were made of the damage done by Pocket Gophers to fruit and shade trees by their gnawing off the roots, which soon destroyed the tree.

Mr. Lounsbury showed me an apple tree, fully 6 inches in diameter, all the roots of which had been cut off by Pocket Gophers. He has lost upwards of 100 apple trees in the past few years by these destructive rodents. Vegetable gardens also suffer severely from their depredations. In some potato fields in exposed situations the inroads are so great that it is a question whether the crop is worth gathering. When a field is badly affected one year the farmer the following spring strives to place the new plant as far from the old as possible, thereby securing a good crop before the Gophers discover the field. Pocket Gophers follow along the rows of hills, commencing when the potatoes are not more than half an inch in diameter and not stopping until the crop is harvested. One farmer alleges that he found in the store-house of a Pocket Gopher at least two quarts of potatoes about the size of cherries.

Considerable damage is done to meadows by the loose dirt brought to the surface from the galleries and deposited in numerous mounds, thereby killing the grass thus covered. Numbers of Pocket Gophers are trapped, but more are killed by placing poisoned potatoes in the galleries.

The losses occasioned by the destruction of crops by Blackbirds and Gophers were so severe that the supervisors of Nobles County, Minn., early in 1887, appropriated $1,500 to pay bounties at the following rates: Blackbirds, 10 cents a dozen before July 1, 6 cents after that date; Striped and Gray Gophers, 3 cents; Pocket Gophers, 5 cents. As is usually the case with bounties little good was accomplished, and no appreciable diminution in the numbers was observed.

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